

Report No. 22 of the
LAKE ERIE DISTRICT

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Forest Resources Inventory

— 1958 —

Division of Timber

Ontario Department of Lands and Forests

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*This volume was donated to
the University of Toronto by
Derek J.W. Little
President, Municipal Planning
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PREFACE

- A large proportion of the earth's land area is covered by forests, which exert an influence, largely beneficial, upon the lives of human beings. Forests reduce soil erosion, regulate stream flow, are a habitat for game, and provide opportunities for recreation. Their prime importance to man, however, is in the production of wood, upon which a wide variety of important industries is based.

Wood, because of its wide distribution and the diverse uses to which it is put, is sometimes known as "the universal raw material." Throughout recorded history, it has been one of our chief sources of fuel. A large proportion is utilized in the construction of buildings of all kinds. Toothpicks, excelsior, shingles, veneer, plywood, boxes and crates are a few of the wide variety of articles produced from wood. Modern adhesives have expanded the use of wood in laminated construction. Chemical utilization has yielded newsprint, writing paper, cartons, paper board, cellophane, rayon and plastics, while even more spectacular advances may lie ahead. Wood distillation produces charcoal, and a residual material which through further processing, can be converted into acetic acid, acetic anhydride, acetone, sodium acetate, methyl alcohol and formaldehyde.

Forests, despite their many benefits and a constantly increasing demand for their products, are being continually destroyed. When it becomes apparent that the forest resource is being depleted, with critical effects upon the supply of products and services, the need for conservation is recognized. Fortunately, forests are renewable, although their restoration may require a considerable period of time. Since 1946, the Department of Lands and Forests has been engaged in a province-wide survey to determine the present status of our forest resources.

The extension of this survey to include the southern agricultural areas was authorized in 1952, and work was started by the Division of Timber early in 1953. Since April 1, 1951, the Federal Department of Northern Affairs and National Resources has reimbursed to the Province one-half of the expenditures incurred in forest resources inventory, under the terms of an agreement pursuant to the provisions of the Canada Forestry Act.

For purposes of administration of the renewable natural resources, the Department of Lands and Forests has established twenty-two districts, each administered by a District Forester and staff, from an office located centrally in the district. The forest resources inventory covers these twenty-two districts, totalling 199,000 square miles, and comprising the accessible forest area of Ontario. This report, the twenty-second in the series, deals with the results of the inventory in the Lake Erie district.

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SURVEY HIGHLIGHTS

1. The total area of the Lake Erie district, excluding 80,172 acres administered by the Federal Government, is 4,126,774 acres, or 6,448 square miles.

2. Inland waters, excluding the "Great Lakes," cover only 57,240 acres, or one per cent of the total area.

3. The total land area of the district, including Federal lands, is 4,149,706 acres. Forested land accounts for 10.3 per cent, agricultural land for 82.1 per cent and other areas, including Federal lands, municipalities, railways, roads, for 7.6 per cent.

4. Ninety-eight per cent of the area of the district is classed as patented land. The areas of Crown land, comprising two per cent of the district, include, for the purposes of this report, all areas administered under an agreement with the Minister of Lands and Forests.

5. Productive forest land, totalling 321,224 acres, is classed as 20 per cent mature, 40 per cent immature, 23 per cent all-aged, 13 per cent young growth and 4 per cent reproducing forest.

6. The district is essentially an area of deciduous forest and has 92 per cent of the productive forest land in the hardwood cover type. The coniferous and mixedwoods type each cover 4 per cent of the area.

7. The primary growing stock in the Lake Erie district is just over 596 million cubic feet and averages 1,857 cubic feet per acre. Hardwoods form 98 per cent of the total volume. Of the total wood volume in the district, 97 per cent occurs on patented lands.

8. The principal species in the district is elm, which forms 29 per cent of the total growing stock. It is followed by soft maple with 17 per cent and sugar maple with 10 per cent of the volume.

9. On patented lands, the 4 to 9-inch size class contains 36 per cent of the volume and the 10-inch and over size class contains 64 per cent of the volume.

10. The annual allowable cut permissible under management is 14.6 million cubic feet. Hardwood species make up 99 per cent of the allowable cut.

11. Elm, which totals nearly 172 million cubic feet, is subjected to a serious attack of the Dutch Elm disease, and the volume of elm in the district is expected to be greatly reduced.

THE PRINCIPAL SPECIES IN THE LAKE ERIE DISTRICT
SHOWN AS A PER CENT OF THE TOTAL WOOD VOLUME





MAP
OF
THE PROVINCE OF ONTARIO
SHOWING
ADMINISTRATIVE DISTRICTS
OF THE
DEPARTMENT OF LANDS AND FORESTS

FOREST INVENTORY

Historical Background

- Loyalists from the American settlements were attracted to the Lake Erie shore, and thus the region was settled at an early date. It was, however, a long time before any but a local market developed for wood, and much of the timber was burned in the course of clearing the land for agriculture.

High-quality products such as square pine and oak, and oak staves were shipped to the Quebec market for export upon completion of the Welland Canal. Sawmilling increased with the opening of the American market, and by 1848 there were 525 sawmills tributary to the lake front. By 1850, the Lake Erie counties were the largest lumber producers in Upper Canada; they were shipping to Buffalo and Cleveland.

It is on record that the best and largest white pine came from this region, and that the light sandy soils of the counties of Haldimand, Norfolk, Brant and Elgin produced pine of a quality never exceeded by any other section on the continent. When the pine was removed, much of the soil was found to be too light to sustain agriculture. In addition, the lake ports, which were dependent upon lumber shipments, continued as fishing villages, but were replaced as shipping ports by settlements back from the lakes upon completion of the railways.

Settlement back from the lake, except for isolated instances, was delayed until after 1820, and the western region around Lake St. Clair was further handicapped by remoteness and the necessity for drainage. As late as 1845, there was little demand for pine logs from this inland area. Much of the area was covered by hardwoods which were of little interest to the lumbermen. These areas were arduously cleared for agriculture, for which they were better suited than the more easily cleared pine lands.

When the construction of roads made penetration of the area possible, it was rapidly settled. The fertile soil and favourable climate make this region well-suited for agriculture. In later years, the proximity of the area to power, transportation and markets has led to rapid industrialization and a large urban population. The natural result of this development has been a marked reduction in the forested area and its restriction to the less favourable sites.

During the period 1900–1925, much of the light soil which was found to be unsuitable for agriculture was abandoned, and the rural population in these areas declined. In 1928, Norfolk County was the first county in Ontario to have a soil survey made. It was completed in time to guide the selection of suitable soil for tobacco growing. The success of tobacco farming brought about considerable re-settlement of the abandoned light soils.

Within the district are two parks unique for their flora and fauna which is of a southern type, dense and luxurious. The Rondeau Provincial Park, of 8.6 square miles, was established in 1894. It contains almost the last natural stand of southern hardwoods in Ontario. The Point Pelee National Park was established in 1918 and covers 6 square miles. Besides the southern trees it contains cactus plants, prickly pear and wild grapes. Such southern birds as the Carolina wren, cardinal, cerulean warbler and blue-gray gnatcatcher are found here.



*White elm tree showing early stages of attack
by the Dutch Elm disease.*

Areas

The total area of the Lake Erie district, excluding Indian Reserve lands and other areas under the administration of the Federal Government, is 4,126,774 acres (table 1), 6,448 square miles. This area is surveyed into 91 townships, which comprise 9 counties. Within the district, inland waters, excluding the "Great Lakes," cover only 57,240 acres, or one per cent of the total area. Productive forest lands occupy 321,224 acres, or 8 per cent of the total area (fig. 1).

TABLE 1. — *Total area classification into broad land and ownership groups.*

Land classification	Crown land	Patented land	Total
	<i>acres</i>	<i>acres</i>	<i>acres</i>
Productive forest land ¹	10,602	310,622	321,224
Non-forested land ²			
Developed agricultural land.....	270	2,904,146	2,904,416
Grass and meadow land.....	274	342,796	343,070
Non-reproducing burn.....			
Wooded pasture.....	462	158,344	158,806
Unclassified land ³	2,084	232,310	234,394
TOTAL.....	3,090	3,637,596	3,640,686
Non-productive forest ⁴			
Open muskeg.....	1,050	33,054	34,104
Treed muskeg (scrub).....		112	112
Brush, alder, and flooded land....	1,220	71,322	72,542
Rock outcrop.....		866	866
TOTAL.....	2,270	105,354	107,624
Water.....	57,240		57,240
TOTAL AREA.....	73,202	4,053,572	4,126,774

¹ Land bearing or capable of bearing timber of a commercial character and not withdrawn from such use.

² Productive forest lands permanently withdrawn from timber production use.

³ Lands occupied by roads, railroads, towns, etc.

⁴ Lands which appear to be permanently out of commercial timber-producing class, owing to very low productivity.

Non-productive forest lands, which appear to be permanently unfit for commercial timber production due to very low productivity, occupy 107,624 acres, or 3 per cent of the total area. Non-forested lands, which include areas permanently withdrawn from timber production, total 3,640,686 acres, or about 88 per cent of the total area. Within this classification, developed agricultural land comprises 2,904,416 acres (fig. 2), nearly 80 per cent of the non-forested

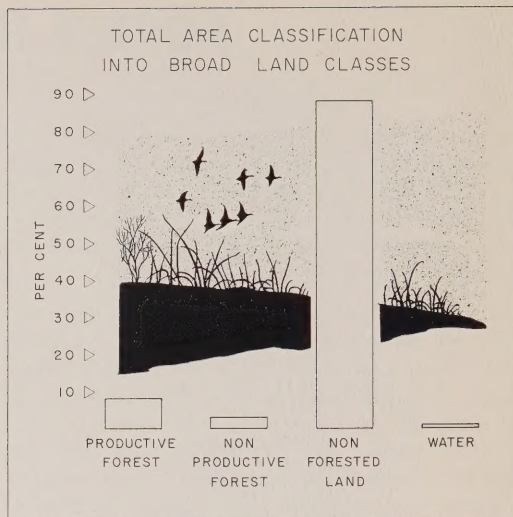


FIGURE 1

area. Grass and meadow occupy 343,070 acres. Areas of low-density stands (often comprised of a few large open-grown trees with wide-spreading crowns) that are quite heavily grazed have been classified as wooded pasture. These total 158,806 acres. In addition, there are 234,394 acres of unclassified land occupied by cities, towns, villages, roads, railways, power lines, gravel-pits or otherwise withdrawn from forest production.

The principal land classifications by townships

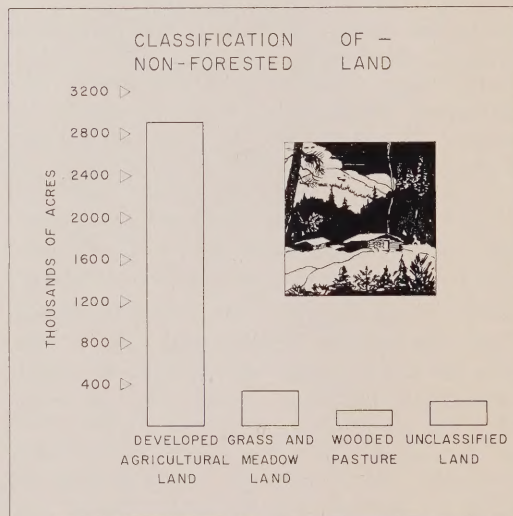


FIGURE 2

and counties (table 2) indicate that Norfolk County, with 15.1 per cent of the land area classed as productive forest and 5.5 per cent as non-productive forest, is the most heavily forested county within the district. It is followed by Lambton County with 9.2 per cent productive forest and 3.4 per cent non-productive forest, and Elgin County with 10.1 per cent productive forest and 0.9 per cent non-productive forest. Essex County, with a forested area of only 4 per cent, almost evenly divided between productive and non-productive land, has the smallest forested area in the district.

An analysis of productive forest land by townships (fig. 3) indicates that the principal forested areas occur in four distinct sections in the district. Bosanquet and West Williams Townships in the north-west corner of the district have 16.8 and 10.9 per cent, respectively, classified as productive forest land. Three townships in the eastern part of the district, Caister, Canborough and South Cayuga, have 10.8, 13.6 and 11.8 per cent of the area classed as productive forest land. Five townships which are located mainly on the Bothwell Sand Plain have the following percentages devoted to productive forest land: Mosa 18.2 per cent, Zone 15.4 per cent, Euphemia

14.0 per cent, Aldborough 12.9 per cent, and Dunwich 10.6 per cent. The greatest areas of productive forest land occur on 8 townships in Norfolk and Elgin Counties. These are located on the Norfolk Sand Plain. Charlotteville Township has 28.7 per cent of the land area classified as productive forest land. This classification includes 18.4 per cent of Houghton, 16.8 per cent of South Walsingham, 15.0 per cent each of Bayham and North Walsingham, 13.5 per cent of Middleton, 13.1 per cent of Windham and 11.2 per cent of Malahide.

Developed agricultural land ranges from 61.0 per cent of the land area in Lambton County to 83.1 per cent in Kent County. Areas classed as grass and meadow vary from a low of 1.8 per cent in Essex County to a high of 17.7 per cent in Middlesex County. Wooded pasture, which covers only 3.8 per cent of the land area in the district, forms between 1.7 and 6.5 per cent of the area by counties. Other areas, which include Federal Lands, form 3.7 per cent of Elgin County and 15.1 per cent of Welland County. Included in this classification is Walpole Island, an area of 38,368 acres in Lambton County that is totally Indian Reserve land.

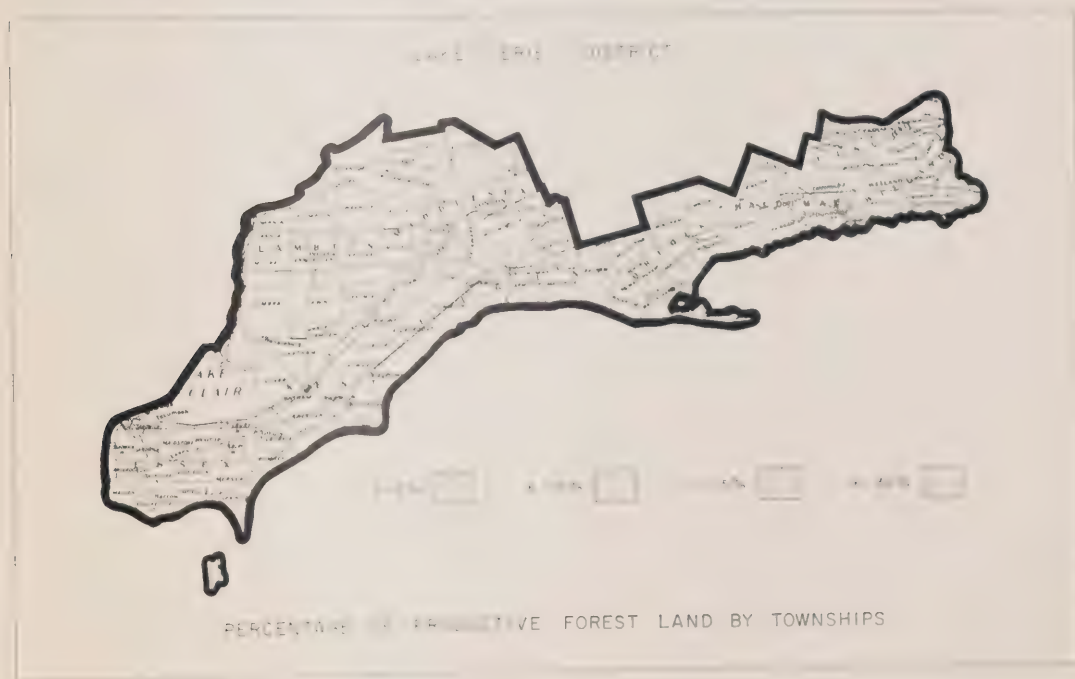


FIGURE 3

TABLE 2. — *Principal land classifications by townships and counties — Lake Erie district.*

Township and county	Total area	Total land area	Forested land				Agricultural land						Other areas ¹	
			Productive		Non-productive		Developed agri- cultural land		Grass and meadow		Wooded pasture			
			acres	per cent	acres	per cent	acres	per cent	acres	per cent	acres	per cent	acres	per cent
Aldborough.....	78,094	77,112	9,944	12.9	1,740	2.3	52,340	67.9	9,120	11.8	2,132	2.7	1,836	2.4
Bayham.....	59,230	58,698	8,798	15.0	332	0.6	40,690	69.3	1,466	2.5	5,772	9.8	1,640	2.8
Dunwich.....	71,338	70,192	7,454	10.6	962	1.4	46,532	66.3	8,590	12.2	4,740	6.8	1,914	2.7
Malahide.....	64,238	63,720	7,122	11.2	482	0.8	48,432	76.0	1,844	2.9	3,512	5.5	2,328	3.6
South Dorchester.....	31,960	31,612	1,590	5.0	52	0.2	27,216	86.1	930	2.9	1,202	3.8	622	2.0
Southwold.....	75,324	74,430	5,278	7.1	128	0.2	53,396	71.7	6,472	8.7	6,540	8.8	2,616	3.5
Yarmouth.....	72,918	71,674	5,164	7.2	324	0.5	52,140	72.7	3,156	4.4	5,512	7.7	5,378	7.5
ELGIN COUNTY.....	453,102	447,438	45,350	10.1	4,020	0.9	320,746	71.7	31,578	7.1	29,410	6.5	16,334	3.7
Anderdon.....	24,252	23,628	542	2.3	1,112	4.7	18,720	79.2	982	4.2	568	2.4	1,704	7.2
Colchester North.....	32,652	31,910	1,078	3.4	122	0.4	28,346	88.8	548	1.7	490	1.5	1,326	4.2
Colchester South.....	35,334	35,004	1,660	4.7	398	1.1	29,328	83.8	812	2.3	830	2.4	1,976	5.7
Gosfield North.....	28,816	28,678	338	1.2	36	0.1	26,672	93.0	260	0.9	356	1.2	1,016	3.6
Gosfield South.....	31,362	30,938	1,132	3.7	180	0.6	26,042	84.2	638	2.1	510	1.5	2,436	7.9
Maidstone.....	46,306	46,000	1,204	2.6	332	0.7	39,686	86.3	606	1.3	868	1.9	3,304	7.2
Malden.....	21,980	21,108	424	2.0	1,374	6.5	17,188	81.4	472	2.3	212	1.0	1,438	6.8
Morsea.....	64,676	63,830	1,884	3.0	1,400	2.2	51,664	80.9	1,190	1.9	714	1.1	6,978	10.9
Pelee Island.....	10,526	10,456	558	5.3	570	5.5	8,060	77.1	322	3.1	462	4.4	484	4.6
Rochester.....	33,764	33,424	456	1.4	176	0.5	30,044	89.9	530	1.5	494	1.5	1,724	5.2
Sandwich East.....	21,460	21,306	168	0.8	142	0.7	10,668	50.1	212	1.0	164	0.7	9,952	46.7
Sandwich South.....	24,200	24,012	466	1.9	298	1.3	20,258	84.4	556	2.3	318	1.3	2,116	8.8
Sandwich West.....	26,860	26,350	390	1.5	482	1.8	12,110	46.0	390	1.5	886	3.3	12,092	45.9
Tilbury North.....	27,230	26,934	214	0.8	620	2.3	24,368	90.5	280	1.0	204	0.8	1,248	4.6
Tilbury West.....	23,238	23,118	342	1.4	60	0.3	20,798	90.0	376	1.6	508	2.2	1,034	4.5
ESSEX COUNTY.....	452,056	446,696	10,856	2.4	7,302	1.6	363,952	81.5	8,174	1.8	7,584	1.7	48,828	11.0
Canborough.....	22,416	21,942	3,010	13.6	674	3.1	16,164	73.7	718	3.3	738	3.4	638	2.9
Dunn.....	17,162	16,094	1,400	8.7	650	4.0	11,852	73.6	810	5.0	626	4.0	756	4.7
Moulton.....	30,108	29,502	3,018	10.2	1,132	3.8	21,592	73.2	1,314	4.5	940	3.2	1,506	5.1
North Cayuga.....	35,272	34,546	3,306	9.6	1,030	3.0	26,496	76.7	1,210	3.5	1,048	3.0	1,456	4.2
Oneida.....	42,592	41,992	2,338	5.6	334	0.8	27,580	65.7	1,324	3.2	892	2.0	9,524	22.7
Rainham.....	26,052	25,710	1,812	7.0	166	0.6	21,654	84.2	502	2.0	734	2.9	842	3.3
Seneca.....	43,856	43,248	3,414	7.9	1,592	3.7	34,026	78.7	2,120	4.8	758	1.8	1,338	3.1
Sherbrooke.....	5,164	5,102	276	5.4	160	3.2	3,936	77.1	214	4.2	172	3.4	344	6.7
South Cayuga.....	14,990	14,658	1,734	11.8	276	1.9	11,444	78.1	438	3.0	320	2.2	446	3.0
Walpole.....	70,194	69,260	2,900	4.2	266	0.4	58,682	84.7	2,272	3.3	1,746	2.5	3,394	4.9
HALDIMAND COUNTY.....	307,806	302,054	23,208	7.7	6,280	2.1	233,426	77.3	10,922	3.6	7,974	2.6	20,244	6.7
Camden.....	43,766	43,140	2,300	5.3	758	1.8	34,644	80.3	2,158	5.0	1,540	3.6	1,740	4.0
Chatham.....	91,386	89,836	2,042	2.3	612	0.7	80,770	89.9	1,228	1.3	1,402	1.6	3,782	4.2
Dover.....	71,502	70,016	434	0.6	6,640	9.5	60,572	86.5	140	0.2	276	0.4	1,954	2.8
Harwich.....	98,216	95,356	4,164	4.4	2,204	2.3	77,820	81.6	4,120	4.3	1,304	1.4	5,744	6.0
Howard.....	60,688	59,880	2,696	4.5	1,010	1.7	49,086	82.0	3,510	5.9	1,678	2.8	1,900	3.1
Orford.....	53,706	53,038	5,130	9.7	1,370	2.6	36,614	69.0	4,620	8.7	1,236	2.3	4,068	7.7
Raleigh.....	74,602	73,558	1,466	2.0	788	1.1	63,938	86.9	3,318	4.5	706	1.0	3,342	4.5
Romney.....	26,820	26,608	1,126	4.2	90	0.3	23,162	87.1	656	2.5	490	1.8	1,084	4.1
Tilbury East.....	56,666	56,022	792	1.4	662	1.2	51,292	91.6	778	1.4	612	1.1	1,886	3.3
Zone.....	27,574	26,920	4,156	15.4	1,758	6.5	15,960	59.3	2,940	10.9	1,094	4.1	1,012	3.8
KENT COUNTY.....	604,926	594,374	24,306	4.1	15,892	2.7	493,858	83.1	23,468	3.9	10,338	1.7	26,512	4.5
Bosanquet.....	79,294	78,074	13,132	16.8	4,126	5.3	46,508	59.6	3,948	5.1	2,882	3.7	7,478	9.5
Brooke.....	74,966	74,168	6,552	8.8	1,698	2.3	48,390	65.3	13,594	18.3	2,268	3.1	1,666	2.2
Dawn.....	68,098	67,490	4,974	7.4	450	0.7	47,568	70.5	9,268	13.7	3,676	5.4	1,554	2.3
Enniskillen.....	87,596	86,792	7,212	8.3	4,080	4.7	58,548	67.4	9,508	11.0	3,032	3.5	4,412	5.1
Euphemia.....	40,136	39,310	5,498	14.0	1,250	3.2	24,576	62.5	5,770	14.7	1,142	2.9	1,074	2.7
Moore.....	73,286	72,912	7,342	10.1	4,972	6.8	43,016	59.0	12,040	16.5	2,906	4.0	2,636	3.6
Plympton.....	78,578	78,032	6,642	8.5	2,110	2.7	53,720	68.8	10,624	13.6	2,530	3.3	2,406	3.1

TABLE 2. — (Cont'd)

Township and county	Total area	Total land area	Forested land				Agricultural land						Other areas ¹	
			Productive		Non-productive		Developed agricultural land		Grass and meadow		Wooded pasture			
			acres	per cent	acres	per cent	acres	per cent	acres	per cent	acres	per cent	acres	per cent
St. Catharines	48,404	48,630	1,860	3.9	1,584	3.3	25,072	52.2	4,192	8.7	1,100	2.3	14,222	29.6
St. Catharines	72,962	72,278	5,892	8.1	1,652	2.3	47,118	65.2	12,706	17.6	3,098	4.3	1,812	2.5
Walpole Island	38,368	38,368											38,368	100.0
Warwick	71,616	70,740	7,196	10.2	2,432	3.4	46,150	65.2	11,392	16.1	1,666	2.4	1,904	2.7
LAMBTON COUNTY	733,304	726,194	66,360	9.2	24,354	3.4	440,666	61.0	93,042	12.8	24,300	3.4	77,532	10.2
Caister	33,898	33,510	3,610	10.8	692	2.0	26,464	79.0	874	2.6	1,198	3.6	672	2.0
Clinton	26,722	26,528	2,044	7.7	140	0.5	21,748	82.0	510	1.9	582	2.2	1,504	5.7
Ganarhous	25,770	24,754	1,994	8.1	292	1.2	20,832	84.1	516	2.1	418	1.7	702	2.8
Guthrie	24,132	22,652	504	2.2	184	0.8	11,404	50.3	470	2.1	202	0.9	9,888	43.7
Louth	20,116	19,108	1,320	6.9	250	1.3	14,994	78.1	788	4.1	678	3.5	1,178	6.1
Niagara	24,626	23,532	940	4.0	178	0.8	18,334	77.9	226	1.0	414	1.7	3,440	14.6
North Grimsby	16,918	16,848	1,712	10.2	100	0.6	12,888	76.5	216	1.3	272	1.6	1,660	9.8
South Grimsby	18,996	18,864	1,242	6.6	50	0.3	16,168	85.4	300	1.6	454	2.4	710	3.7
LINCOLN COUNTY	190,578	185,896	13,366	7.2	1,886	1.0	142,772	76.8	3,900	2.1	4,218	2.3	19,754	10.6
Adelaide	46,034	45,336	2,400	5.3	1,370	3.0	24,308	53.6	13,524	29.9	2,184	4.8	1,550	3.4
Biddulph	41,372	41,284	924	2.2	156	0.4	27,758	67.2	9,416	22.8	2,330	5.7	700	1.7
Caradoc	76,792	75,856	5,656	7.4	1,660	2.3	39,164	51.6	11,392	15.0	3,626	4.8	14,352	18.9
Delaware	30,308	29,944	1,918	6.4	32	0.1	16,246	54.3	2,668	8.9	2,868	9.6	6,212	20.7
East Williams	39,674	39,086	2,332	5.9	1,486	3.8	19,070	48.8	11,798	30.2	2,698	6.9	702	1.8
Ekfrid	54,642	53,842	3,592	6.7	1,948	3.6	33,794	62.8	11,300	21.0	1,760	3.2	1,448	2.7
Lobo	48,194	47,802	3,198	6.7	556	1.2	27,764	58.1	12,484	26.1	2,560	5.3	1,240	2.6
London	108,434	107,160	5,042	4.7	1,274	1.2	63,420	59.2	17,322	16.1	7,162	6.7	12,940	12.1
Metcalfe	36,992	36,362	2,874	7.9	1,734	4.8	21,564	59.3	7,568	20.8	1,896	5.2	726	2.0
Moscow	49,774	48,742	8,848	18.2	2,820	5.8	27,560	56.5	5,718	11.7	2,108	4.3	1,688	3.5
McGillivray	68,660	67,968	5,434	8.0	2,488	3.7	41,156	60.6	14,324	21.1	3,380	5.0	1,186	1.6
North Dorchester	54,204	53,636	4,780	8.9	520	1.0	38,702	72.1	4,518	8.4	3,338	6.2	1,808	3.4
Westminster	66,988	65,190	2,890	4.4	290	0.4	45,652	70.0	4,572	7.0	4,448	6.9	7,338	11.3
West Missouri	51,982	51,488	1,754	3.4	518	1.0	36,326	70.6	7,524	14.6	3,928	7.6	1,438	2.8
West Williams	36,468	35,878	3,892	10.9	1,446	4.0	19,620	54.7	7,814	21.8	2,200	6.1	906	2.5
MIDDLESEX COUNTY	809,548	799,568	56,504	7.1	18,298	2.3	482,104	60.3	141,942	17.7	46,486	5.8	54,234	6.8
Charlotteville	60,936	60,734	17,452	28.7	3,508	5.8	33,454	55.1	2,394	3.9	2,302	3.8	1,624	2.7
Houghton	34,196	33,892	6,246	18.4	756	2.2	22,998	67.9	764	2.3	2,266	6.7	862	2.5
Middleton	46,804	46,368	6,276	13.5	796	1.7	32,440	70.0	1,292	2.8	3,696	8.0	1,868	4.0
North Walsingham	41,078	40,712	6,116	15.0	116	0.3	29,966	73.6	578	1.4	3,156	7.8	780	1.9
South Walsingham	55,420	55,056	9,266	16.8	14,030	25.5	22,038	40.0	2,150	3.9	5,226	9.5	2,346	4.3
Townsend	66,102	65,268	4,558	7.0	898	1.4	51,830	79.4	4,180	6.4	1,596	2.4	2,206	3.4
Windham	68,028	67,592	8,828	13.1	1,960	2.9	49,694	73.5	2,490	3.7	2,458	3.6	2,162	3.2
Woodhouse	36,974	36,654	2,666	7.3	282	0.8	27,228	74.3	2,946	8.0	664	1.8	2,868	7.8
NORFOLK COUNTY	409,538	406,276	61,408	15.1	22,346	5.5	269,648	66.4	16,794	4.1	21,364	5.3	14,716	3.6
Bertie	37,878	37,306	2,982	8.0	338	0.9	21,820	58.4	2,298	6.2	1,188	3.2	8,680	23.3
Crowland	21,326	21,050	2,080	9.9	608	2.9	13,332	63.3	1,082	5.2	386	1.8	3,562	16.9
Humberstone	32,478	31,778	3,134	9.9	1,664	5.0	20,124	63.3	1,696	5.3	1,078	3.4	4,142	13.1
Pelham	30,226	29,852	2,496	8.4	298	1.0	22,496	75.4	1,406	4.7	1,322	4.4	1,834	6.1
Stamford	25,200	24,762	1,370	5.5	428	1.7	10,504	42.5	1,242	5.0	496	2.0	10,722	43.3
Thorold	26,660	25,222	1,896	7.5	364	1.4	15,752	62.5	2,060	8.2	1,044	4.1	4,106	16.3
Wainfleet	52,508	51,782	4,086	7.8	3,302	6.4	38,204	73.8	2,798	5.4	1,324	2.6	2,068	4.0
Willoughby	19,812	19,458	1,882	9.7	304	1.5	15,012	77.2	668	3.4	294	1.5	1,298	6.7
WELLAND COUNTY	246,088	241,210	19,926	8.2	7,246	3.0	157,244	65.2	13,250	5.5	7,132	3.0	36,412	15.1
TOTAL—L. ERIE DISTRICT	4,206,946 ²	4,149,706 ²	321,224	7.7	107,624	2.6	2,904,416	70.0	343,070	8.3	158,806	3.8	314,566 ²	7.6

¹ Other areas include all land administered by the Federal Government, and roads, railways, villages, towns, cities, gravel-pits, etc.² These totals include land areas administered by the Federal Government.

Forest Land Ownership

Land settlement, from the earliest days, has been accompanied by various regulations under which certain tree species, principally oak and pine, were reserved to the Crown. Pine trees were reserved on land located as free grants by The Act of 1868, but they were returned to the grantee with the land when patent was issued. After 1880, however, the usual practice in Ontario was to reserve pine timber to the Crown when the patent was issued.

This condition existed until 1937, except that in 1913 an amendment to The Public Lands Act provided that where land was not in timber licence and the locatee was in residence with improvements, he could request that pine trees be included in the patent, or in the event that patent had previously been issued, he could request a pine patent.

The Public Lands Amendment Act, 1946, granted to the patentee all species of timber on land disposed of for agricultural purposes and patented prior to May 1, 1880. Subsequently, all pine reservations were removed from lands patented for agricultural purposes, regardless of the date of patent (Stat. 1951, chap. 71).

The Forestry Act (Stat. 1952, chap. 32) permits the Minister of Lands and Forests to enter into an agreement with the owners of lands that are suitable for forestry purposes for the reforestation and management of such lands for a stated period of years, which must not be less than 20 years.

Under the terms of The Trees Act (R.S.O. 1950, chap. 399), municipalities may purchase land and either place the responsibility of reforestation and management in the hands of the Province through co-operative agreements, or carry out the planting and management of the forests without an agreement. The agreement provides that the Province will assume the responsibility for re-establishment and care of the forest for a stated period of years, usually fifty in recent agreements. At the end of the agreed period, the municipality may exercise one of three options: first, to renew the agreement; second, to take over the project by paying to the Crown the cost of the development without interest, while revenue received by the Province during the period of the agreement is credited to the project; third, to relinquish title to the land and receive its original purchase price.

The Conservation Authorities Act (R.S.O. 1950, chap. 62) permits the "Authority" to enter into an agreement with the Minister of Lands and Forests for the administration of Authority Forests. These agreements are similar, although not identical, to those entered into by the municipalities and the Crown.

Within the Lake Erie district 4,053,572 acres, or 98 per cent of the area, is classified as patented land. Only 73,202 acres, or 2 per cent of the area, is administered by the Crown. The Crown area is made up of 15,962 acres, or 22 per cent, of land, and 57,240 acres, or 78 per cent, of inland water.

For the purposes of this report, the Crown areas include 380 acres of county forests in Kent and Middlesex Counties and 2,888 acres of authority forests in the Ausable, Upper Thames, Big Creek

TABLE 3. — *Classification of productive forest land into types and age classes.*

Age class and cover type	Crown land	Patented land	Total	
	acres	acres	acres	per cent
Mature forest:				
Coniferous.....				
Hardwood.....	2,248	60,932	63,180	20
Mixedwoods.....		940	940	*
TOTAL.....	2,248	61,872	64,120	20
Immature forest:				
Coniferous.....	38	400	438	*
Hardwood.....	3,936	119,182	123,118	38
Mixedwoods.....	74	5,808	5,882	2
TOTAL.....	4,048	125,390	129,438	40
All-aged forest:				
Hardwood.....	1,012	69,184	70,196	22
Mixedwoods.....	80	2,952	3,032	1
TOTAL.....	1,092	72,136	73,228	23
Young growth:				
Coniferous.....		194	194	*
Hardwood.....	370	38,500	38,870	12
Mixedwoods.....		1,452	1,452	1
TOTAL.....	370	40,146	40,516	13
Reproducing forest.....	2,844	11,078	13,922	4
TOTAL PRODUCTIVE FOREST.....	10,602	310,622	321,224	100

* Less than one per cent.

and Otter Creek Authorities administered by the Minister of Lands and Forests under the authority of The Forestry Act. Crown lands also include ten Provincial Parks totalling 10,230 acres and the provincial forest tree nursery of 4,200 acres established at St. Williams in 1908.

Age Classes

A forest, to produce sustained timber yields, should be made up of trees of all age classes and stages of development from seedlings to mature timber, in such proportions that when one group of trees is harvested, another is ready to take its place.

The total productive forest area of the Lake Erie district is classed as 20 per cent mature, 40 per cent immature, 23 per cent all-aged, 13 per cent young growth and 4 per cent reproducing forest (table 3, fig. 4).

Patented lands, totalling 310,622 acres, or 97 per cent of the productive forest area, have an identical distribution to that for the total productive forest area.

On Crown lands, which occupy only 3 per cent of the productive forest area, the mature forest covers 21 per cent, the immature 38 per cent, the all-aged 10 per cent, young growth 4 per cent and reproducing forest 27 per cent.

Regional Forest Types

Except for Biddulph Township, the Lake Erie district lies wholly within the Deciduous Forest

Region. This region, which occupies the greater part of the eastern United States, makes its only occurrence in Canada in this southwestern region of Ontario.

Here the favourable climatic conditions, with a growing season of over 150 days, coupled with fertile soil, have led to a highly developed agricultural area and the resultant elimination of most of the original forest cover. Forests now occur mainly as woodlots, restricted to poorer and moister sites, or as coniferous plantations of introduced species, on the light, sandy soils.

Separate volume and yield tables are prepared for each region, or section, and they serve as units in the compilation of volume estimates. Two forest sections occur within the Lake Erie district, as follows:

1. The Niagara section, of the Deciduous forest region, occupies 99 per cent of the total area.
2. The Huron section, of the Great Lakes-St. Lawrence forest region, occurs in Biddulph Township, one per cent of the total area.

In the Niagara section, the associations are predominantly composed of deciduous trees. This section contains the main Canadian distribution of sycamore, swamp white oak, black walnut and shagbark hickory. Many broadleaved trees find their northern limit here, including the chestnut, tulip tree, mockernut and pignut hickories, chinquapin, chestnut, scarlet and pin oaks, blue ash,



FIGURE 4

black gum, magnolia, papaw, Kentucky coffee tree, redbud, red mulberry and sassafras. Also included are the more widely distributed butternut, bitternut hickory, rock elm, silver maple and blue beech. Except for plantations, conifers are poorly represented.

The Huron section supports a broadleaved forest in which sugar maple and beech are the principal species, while elm and soft maple are common. Many other deciduous trees occur as scattered groups or individuals in the region.

Forest distribution in this district has been greatly influenced by the use of land for agricultural purposes, and by industrial and urban development. Its occurrence has been further influenced by the effect of local land forms, or minor physiographic regions¹ (fig. 5), on land settlement. A general description of these regions is given below:

1. *Huron Fringe*. — A narrow area adjacent to Lake Huron made up of the wave-cut terraces, with their boulders, gravel bars and sand dunes, of glacial lakes.

2. *Huron Slope*. — A clay plain, rising 600 to 900 feet above sea-level, is modified by a narrow strip of sand and the twin beaches of glacial Lake Warren.

3. *Horseshoe Moraines*. — The southern portions of the eastern and western arms of these moraines occur in this district. The western arm consists of knobby clay ridges flanked by a spillway, while the eastern arm is more hilly and stony and contains more sand and gravel.

4. *St. Clair Clay Plains*. — Covering some 2,270 square miles, this is the largest physiographic region in the district. The area is one of little relief, in which minor variations in elevation have had a great effect on the vegetation and soils. Essex County and the adjacent parts of Kent are underlain by limestone, while the remainder is underlain by black shale.

Within this plain, four areas have been described separately.

Essex County and southwestern Kent form a fairly uniform region called the Essex clay plain, which belongs to the northern fringe of the American corn belt. Parts of it are devoted to such early truck crops as tomatoes, strawberries, sweet corn and cucumbers.

The Lambton clay plain, an area with a shallow layer of clay on the till, occurs in Lambton County. It is an area of faint knoll and sag relief, having somewhat better drainage than the Essex clay plain, and a greater portion of the land is devoted to pasture.

The Chatham flats occupy a 256 square mile area east of Lake St. Clair. This flat area of highly productive, fertile, durable soils remained undeveloped until artificial drainage was established by the municipalities. It is largely devoted to the production of cash crops such as corn, sugar beets, soybeans, tobacco, tomatoes and peas.

The St. Clair delta, at the mouth of the St. Clair River, consists of a series of islands. It is a marshy area, with the outer border formed by a meadow.

5. *Erie Spits*. — Three great sand spits, Long Point, Rondeau and Point Pelee, extend into Lake Erie. Much of their area is at lake level, or lower, and the climate is, next to Pelee Island, the most temperate in Ontario.

6. *Pelee Island*. — Covering 15 square miles, this island, with adjacent islets, is the southernmost land in Canada. The moderately deep clay plain is drained by deep drainage canals and ditches. It has the longest growing season in Canada, and soybeans form the principal crop. During the past few years the island has been noted for its pheasants, and fees for hunting these birds provide a considerable revenue.

7. *Bothwell Sand Plain*. — This plain, the delta of the Thames River in glacial Lake Warren, covers about 700 square miles. A thin layer of sand over clay has produced a high water table. This is an area of low-grade soil, with a high proportion of the wetter parts remaining under forest cover.

8. *Ekfrid Clay Plain*. — An area of stratified clays with occasional knolls or ridges of sand and gravel superimposed on the clay. The soil is good, but agriculture is limited by slow drainage. Over half of this small plain is devoted to pasture.

9. *Caradoc Sand Plain*. — This area of small plains has an overburden of sand or other light-textured, waterlaid deposits.

10. *Stratford Till Plain*. — A broad clay plain, sloping to the southwest, this ground moraine is interrupted by several terminal moraines. A brown

¹ L. J. Chapman and D. F. Putnam. *The Physiography of Southern Ontario*, University of Toronto Press, 1951.

LAKE ERIE DISTRICT



PHYSIOGRAPHIC REGIONS

FIGURE 5

calcareous silty clay till is fairly uniform throughout this area.

11. *Oxford Till Plain*. — A good soil, composed of brown calcareous till, characterizes this undulating upland area.

12. *Mount Elgin Ridges*. — Well-drained morainic ridges of pale brown calcareous clay loam lie about 100 feet above poorly drained valleys containing alluvial gravel, sand and silt loam.

13. *Norfolk Sand Plain*. — Including the greater part of Norfolk county and the eastern end of Elgin County, this is an area of silt and clay beds deeply overlain by 30 to 75 feet of sand. Drainage is to Lake Erie by small streams which have cut deep valleys into the sand plain. Abundant well-water is a feature of this area. After original clearing the original humus was rapidly exhausted, productivity declined, wind erosion increased and many farms were abandoned. A forest tree nursery was established at St. Williams to assist a reforestation programme. In recent years the sandy, infertile soils have been utilized extensively for tobacco growing.

14. *Haldimand Clay Plain*. — A confused inter-

mixture of stratified clay and till, it consists of a series of parallel belts commencing at the high ground adjoining the Niagara escarpment. The central portion of the plain is much dissected by tributary drainage. The southeastern part of the peninsula is characterized by levelness and poor drainage. The clay plain is broken by several regions of light-textured soils on which specialized types of agriculture are developing. In general, the plain is devoted to general farming with the emphasis on livestock.

15. *Niagara Escarpment*. — The escarpment forms a simple topographic break, about 300 feet high, between the two levels of the Niagara Peninsula. In some places, there is a broad sloping bench covered by several feet of boulder clay, between the escarpment and the old Iroquois shoreline. There are several breaks in this stretch, some of which provide easy access over the ridge.

16. *Iroquois Plain*. — Within this district, the plain consists of the Niagara fruit belt developed on the sandy soils east of Grimsby. These shallow beds of sand overlying clay present a problem in drainage. West of Grimsby, the red clay soil is heavy in texture and low in permeability, and thus dries out rapidly.

Cover Types

Many of the species occurring within the Lake Erie district have only a scattered representation and do not occur in sufficient volume to be recorded in this report. A large number of the deciduous species characteristic of the Niagara ecological section are in this category, along with some exotic species introduced in the plantations of the district. Volumetric data are shown for 5 coniferous and 16 broadleaved species.

The forests of the district are described under three main cover types: coniferous, hardwood and mixedwoods. The coniferous type is one in which 75 per cent or more of the number of trees are conifer or softwood trees; the hardwood type is composed of 75 per cent or more of hardwood or broadleaved trees. All other combinations are classed as mixedwoods. In addition to the three

TABLE 4. — *Classification of productive forest lands into cover types.*

Cover type and age class	Crown land		Patented land		Total	
	acres	per cent	acres	per cent	acres	per cent
Coniferous type:						
Mature.....						
Immature.....	38	*	400	*	438	*
Young growth.....			194	*	194	*
Plantations.....	2,844	27	9,712	3	12,556	4
TOTAL.....	2,882	27	10,306	3	13,188	4
Hardwood type:						
Mature.....	2,248	21	60,932	20	63,180	20
Immature.....	3,936	37	119,182	38	123,118	38
All-aged.....	1,012	10	69,184	22	70,196	22
Young growth.....	370	3	38,500	13	38,870	12
Plantations.....			492	*	492	*
TOTAL.....	7,566	71	288,290	93	295,856	92
Mixedwoods type:						
Mature.....			940	*	940	*
Immature.....	74	1	5,808	2	5,882	2
All-aged.....	80	1	2,952	1	3,032	1
Young growth.....			1,452	1	1,452	1
Plantations.....						
TOTAL.....	154	2	11,152	4	11,306	4
Reproducing forest.....			874	*	874	*
TOTAL PRODUCTIVE FOREST.....	10,602	100	310,622	100	321,224	100

* Less than one per cent.

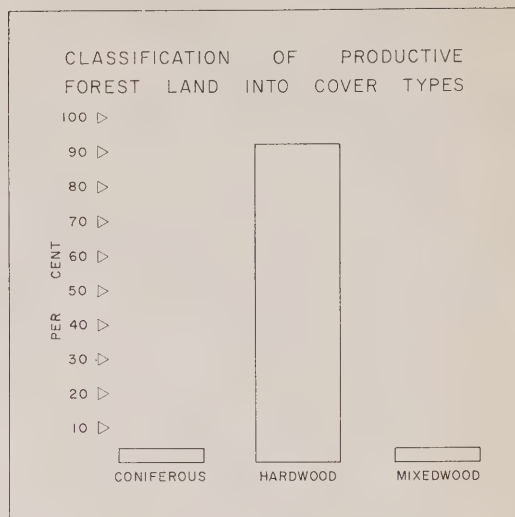


FIGURE 6

main cover types, there are small areas of recently established natural reproduction that have not yet attained a sufficiently stable composition to be classified into cover types. The artificially established plantations are areas of reproduction which have been classified according to cover type.

The hardwood type occupies 92 per cent of the productive forest land (table 4); the mixedwoods type and the coniferous type each cover 4 per cent (fig. 6). The distribution on patented land varies only 1 per cent from these figures.

On Crown land, the hardwood type occurs on 71 per cent of the productive forest area, the coniferous type on 27 per cent, and the mixedwoods type on 2 per cent.

There are 874 acres within the district classed as reproducing forest. In addition, there are 12,556 acres of coniferous plantations and 492 acres of hardwood plantations. Thus, the total area classified as reproducing forest amounts to only 13,922 acres.

Volume

The volume of the primary growing stock includes all living trees 3.6 inches d.b.h. outside bark and over which are standing on the productive forest lands of the district; it consists of the wood volume inside bark in cubic feet, including stump and top and cull

or defective portions of living trees, but excludes all limb wood.

The volume of the primary growing stock on productive forest lands in the Lake Erie district is just over 596 million cubic feet (596,520,000 cubic feet). This is an average of 1,857 cubic feet per acre (table 5). The mature age class contains 185.3 million cubic feet (table 6), or 2,890 cubic feet per acre; the immature age class contains 217.9 million cubic feet, or 1,684 cubic feet per acre; and the all-aged stands contain 193.3 million cubic feet, or 2,640 cubic feet per acre.

Crown lands in the Lake Erie district have just under 16 million cubic feet (table 7), or an average of 1,480 cubic feet per acre. The mature age class contains 7.1 million cubic feet or 3,170 cubic feet per acre; the immature 5.7 million cubic feet, or 1,403 cubic feet per acre; and the all-aged stands, 2.9 million cubic feet, or 2,645 cubic feet per acre.

Patented lands within the district have a primary growing stock of almost 581 million cubic feet (table 8), averaging 1,870 cubic feet per acre. The mature age class totals 178.2 million cubic feet, or 2,880 cubic feet per acre; the immature age class contains 212.2 million cubic feet, or 1,692 cubic feet per acre; and all-aged stands contain 190.4 million cubic feet (fig. 7), or 2,640 cubic feet per acre.

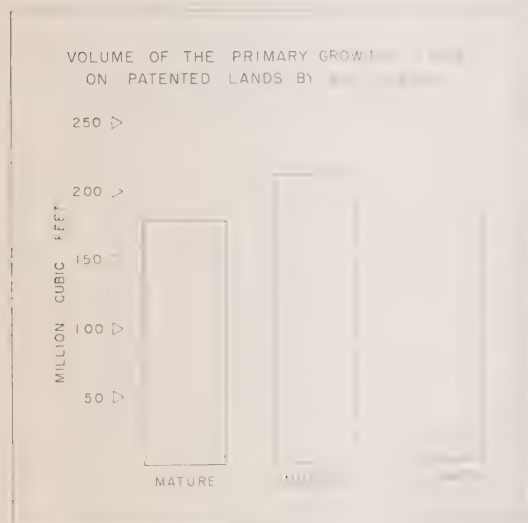


FIGURE 7

TABLE 5. -- Volume per acre of the primary growing stock.

	Crown land			Patented land			Average Total
	4" d.b.h.	9" d.b.h.	10" up Average total	4" d.b.h.	9" d.b.h.	10" up Average total	
	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Mature	564	2,606	3,170	514	2,366	2,880	2,890
Immature	776	627	1,403	935	757	1,692	1,684
All-aged	836	1,809	2,645	832	1,808	2,640	2,640
Total	502	1,978	1,480	673	1,197	1,870	1,857



Larval galleries of the European elm bark beetle on the inner bark surface of elm.

TABLE 6. — *Cubic-foot volumes of primary growing stock on productive forest land (Crown plus patented land) in the Lake Erie district by species group, age class, and cover type in two size classes.*

ALL SPECIES

Cover type	Mature		Immature		All-aged		Total all lands
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.
Coniferous			590	320			910
Hardwood	32,464	150,111	113,660	92,342	57,980	126,829	573,386
Mixedwoods	575	2,135	6,178	4,828	2,928	5,580	22,224
TOTAL	33,039	152,246	120,428	97,490	60,908	132,409	596,520

ALL CONIFERS

Cover type	Mature		Immature		All-aged		Total all lands
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.
Coniferous			465	152			617
Hardwood	2	6	222	837	354	1,037	2,458
Mixedwoods	243	796	2,187	1,136	1,022	2,186	7,570
TOTAL	245	802	2,874	2,125	1,376	3,223	10,645

ALL HARDWOODS

Cover type	Mature		Immature		All-aged		Total all lands
	4" 9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.
Coniferous			125	168			293
Hardwood	32,461	150,105	113,438	91,505	57,626	125,791	570,926
Mixedwoods	333	1,339	3,991	3,692	1,906	3,395	14,656
TOTAL	32,794	151,444	117,554	95,365	59,532	129,186	585,875

TABLE 7. — *Cubic-foot volumes of primary growing stock on Crown land in the Lake Erie district by species group, age class and cover type in two size classes.*

ALL SPECIES

Cover type	Mature		Immature		All-aged		Total Crown land
	4"-9" d.b.h.	10" up d.b.h.	4" 9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.
Coniferous			54	29			83
Hardwood	1,267	5,859	3,006	2,445	836	1,829	15,242
Mixedwoods			80	63	77	147	367
TOTAL	1,267	5,859	3,140	2,537	913	1,976	15,692

ALL CONIFERS

Cover type	Mature		Immature		All-aged		Total Crown land
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.
Coniferous			43	14			57
Hardwood			5	22	5	15	47
Mixedwoods			28	15	27	58	128
TOTAL			76	51	32	73	232

ALL HARDWOODS

Cover type	Mature		Immature		All-aged		Total Crown land
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.	Thou-sand cu. ft.
Coniferous			11	15			26
Hardwood	1,267	5,859	3,001	2,423	831	1,813	15,194
Mixedwoods			52	48	50	90	240
TOTAL	1,267	5,859	3,064	2,486	881	1,903	15,460

TABLE 8. — *Cubic-foot volumes of primary growing stock on patented land in the Lake Erie district by species group, age class and cover type in two size classes.*

ALL SPECIES

Cover type	Mature		Immature		All-aged		Total patented land
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	
Coniferous	.....	.....	537	291	.....	.....	828
Hardwood	31,196	144,252	110,653	89,897	57,144	125,000	558,142
Mixedwoods	576	2,135	6,098	4,765	2,851	5,433	21,858
TOTAL	31,772	146,387	117,288	94,953	59,995	130,433	580,828

ALL CONIFERS

Cover type	Mature		Immature		All-aged		Total patented land
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	
Coniferous	.....	.....	422	138	.....	.....	560
Hardwood	2	6	217	815	350	1,022	2,412
Mixedwoods	243	796	2,159	1,121	994	2,128	7,441
TOTAL	245	802	2,798	2,074	1,344	3,150	10,413

ALL HARDWOOD

Cover type	Mature		Immature		All-aged		Total patented land
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	
Coniferous	.....	.....	114	153	.....	.....	267
Hardwood	31,194	144,246	110,437	89,082	56,795	123,978	555,732
Mixedwoods	333	1,339	3,939	3,644	1,856	3,405	14,416
TOTAL	31,527	145,585	114,490	92,879	58,651	127,383	570,415



White elm tree with advanced stage of the Dutch Elm disease.

Species

Hardwood species, totalling almost 586 million cubic feet (table 9), comprise 98 per cent of the volume in the Lake Erie district. Conifers, which comprise the remaining 2 per cent, have a volume of 10.6 million cubic feet.

Nine species comprise 89 per cent of the volume on productive forest land (fig. 8). Elm is the principal species within the district, comprising 29 per cent of the total growing stock. It is followed by soft maple and sugar maple, which form 17 and 10 per cent, respectively, of the total growing stock. White ash comprises 8 per cent, beech 7 per cent, red and white oak 5 per cent each, and basswood and poplar 4 per cent each. White pine is the principal conifer, with 49 per cent of the coniferous volume, which represents just under one per cent of the total growing stock.

In the mature age class five species make up 79 per cent of the volume; elm 31 per cent, soft maple 21 per cent, sugar maple 12 per cent, beech 8 per cent and white ash 7 per cent. Sixty-two per cent of the immature volume is contained in five species: elm 27 per cent, soft maple 13 per cent, white ash

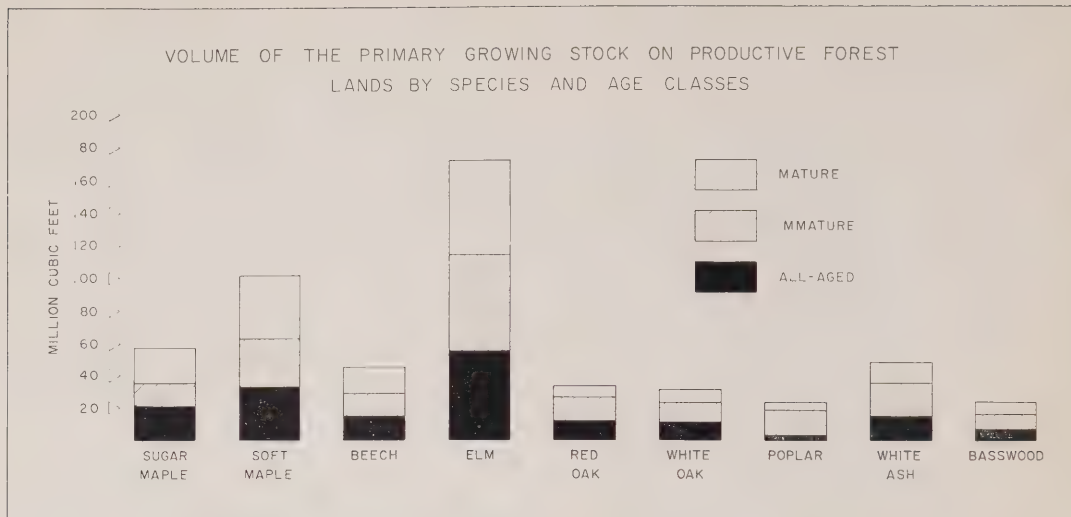


FIGURE 8

9 per cent, beech 7 per cent and sugar maple 6 per cent. In the all-aged stands elm forms 28 per cent, soft maple 17 per cent and sugar maple 11 per cent.

Crown lands have nearly 16 million cubic feet (table 10), of which 99 per cent is hardwoods. The principal species are elm, soft maple, sugar maple, white ash and beech. In the immature age class poplar replaces beech as the fifth species, and in the all-aged stands beech has a slightly higher volume than white ash.

Patented lands have 10 million cubic feet of coniferous volume and 570 million cubic feet of hardwood volume (table 11). The principal species are elm, soft maple and sugar maple. Elm comprises 31 per cent of the mature, 27 per cent of the immature, and 28 per cent of the volume in the all-aged stands. Soft maple forms 21 per cent of the mature, 13 per cent of the immature and 17 per cent of the all-aged volume, while for hard maple these percentages become 12, 6 and 11, respectively.

Size Class Relationship

In compiling the inventory, volumes of the primary growing stock are shown for two size classes, the smaller material from 4-9 inches d.b.h. and the larger trees 10 inches d.b.h. and over. Volumes in trees 4 to 9 inches d.b.h. are considered as pulpwood and cordwood material, depending on species, although products such as posts, poles and railway

ties may be obtained from this size class. Volumes in the 10-inch and over size class have values for sawlogs and other uses where large timber is required. A tree 10 inches d.b.h. outside bark will, on the average, produce one log sixteen feet long, 8 inches in diameter inside bark at the small end. In addition, there is residual smaller-size material in the top which may be used as pulpwood or for

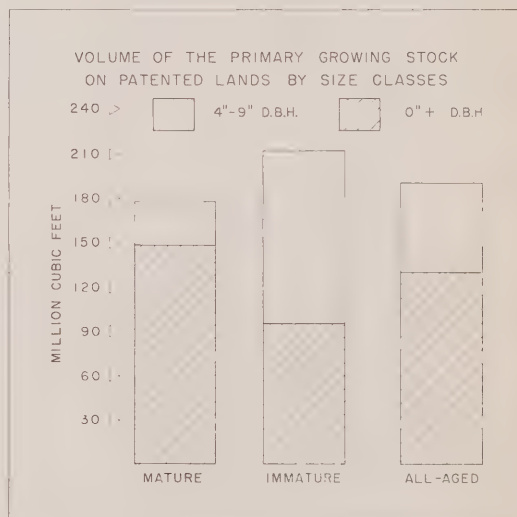


FIGURE 9

TABLE 9. — *Cubic-foot volumes of primary growing stock on productive forest land in the Lake Erie district by species and age class in two size classes.*

Species	Mature		Immature		All-aged		Total all lands
	4"-9"	10" up	4"-9"	10" up	4"-9"	10" up	
	d.b.h.	d.b.h.	d.b.h.	d.b.h.	d.b.h.	d.b.h.	
	Thou- sand cu. ft.	Thou- sand cu. ft.	Thou- sand cu. ft.	Thou- sand cu. ft.	Thou- sand cu. ft.	Thou- sand cu. ft.	cu. ft.
White pine	45	497	526	1,246	663	2,189	5,166
Red pine					234	407	641
White spruce			22	11			33
Black spruce			5				5
Balsam fir			80	8			88
Hemlock	112	197	188	356	190	498	1,541
White cedar	85	106	1,794	402	289	129	2,805
Larch	3	2	259	102			366
TOTAL CONIFERS	245	802	2,874	2,125	1,376	3,223	10,645
Sugar maple	3,965	18,182	8,632	5,365	7,583	13,176	56,903
Soft maple	4,638	33,846	15,519	13,817	10,006	23,314	101,140
White birch	7	13	1,405	226	108	55	1,814
Yellow birch	495	750	2,164	856	1,118	1,073	6,456
Beech	2,426	13,223	6,632	7,628	4,226	10,523	44,658
Elm	8,832	49,020	28,130	30,527	14,743	40,316	171,568
Ironwood	947	153	2,553	119	1,633	260	5,665
Red oak	779	6,294	6,632	6,780	2,903	9,122	32,510
White oak	1,613	6,442	5,764	6,037	3,620	7,375	30,851
Poplar	1,219	3,191	9,988	4,979	1,329	1,904	22,610
Black ash	590	349	2,714	504	1,041	663	5,861
White ash	3,355	9,605	11,782	7,978	4,874	9,942	47,546
Basswood	1,252	6,443	4,037	4,946	1,487	5,570	23,735
Black cherry	567	1,486	2,938	2,136	1,215	2,032	10,374
Butternut		1			226	615	842
Hickory	2,109	2,446	8,664	3,467	3,420	3,246	23,352
TOTAL HARDWOODS	32,794	151,444	117,554	95,365	59,532	129,186	585,875
TOTAL ALL SPECIES	33,039	152,246	120,428	97,496	60,908	132,409	596,520

purposes other than saw timber. The total quantity of wood in this residual top is relatively small, and is included in the 10 inches and over material in all inventory estimates.

Patented lands contain 97 per cent of the total wood volume in the Lake Erie district. Considering all age classes on patented land, the 4 to 9-inch class contains 209.1 million cubic feet, or 36 per cent of the volume; and the 10-inch and over d.b.h. class contains 371.8 million cubic feet, or 64 per cent of the total volume (table 11). The 10-inch and over class contains 82 per cent of the mature volume, 45 per cent of the immature volume and 68 per cent

TABLE 10. — *Cubic-foot volumes of primary growing stock on Crown land in the Lake Erie district by species and age class in two size classes.*

Species	Mature		Immature		All-aged		Total Crown land
	4"-9"	10" up	4"-9"	10" up	4"-9"	10" up	
	d.b.h.	d.b.h.	d.b.h.	d.b.h.	d.b.h.	d.b.h.	
	Thou- sand cu. ft.	Thou- sand cu. ft.	Thou- sand cu. ft.	Thou- sand cu. ft.	Thou- sand cu. ft.	Thou- sand cu. ft.	Thou- sand cu. ft.
White pine				10	32	13	46
Red pine						6	11
White spruce				2	1		3
Black spruce							
Balsam fir				6	1		7
Hemlock				3	5	5	13
White cedar				50	11	8	72
Larch				5	1		6
TOTAL CONIFERS				76	51	32	73
Sugar maple	153	702	225	141	111	192	1,524
Soft maple	178	1,318	402	354	148	342	2,742
White birch			33	6	3	1	43
Yellow birch	17	26	51	21	18	16	149
Beech	93	505	176	202	62	158	1,196
Elm	343	1,901	735	787	216	594	4,576
Ironwood	37	6	68	3	24	4	142
Red oak	30	241	175	180	44	138	808
White oak	62	245	152	160	55	108	782
Poplar	47	124	255	128	20	28	602
Black ash	22	13	68	13	16	10	142
White ash	131	375	312	212	71	144	1,245
Basswood	49	251	106	130	22	82	640
Black cherry	22	56	76	57	18	30	259
Butternut					3	9	12
Hickory	83	96	230	92	50	47	598
TOTAL HARDWOODS	1,267	5,859	3,064	2,486	881	1,903	15,460
TOTAL ALL SPECIES	1,267	5,859	3,140	2,537	913	1,976	15,692

of the all-aged volume (fig. 9). When the species groups are considered separately, 58 per cent of the coniferous volume and 64 per cent of the hardwood volume occur in the larger size class.

Coniferous species have 77 per cent of their mature volume and 70 per cent of the all-aged volume in the sawlog size class, while the immature age class produces 57 per cent cordwood material and 43 per cent sawlog material. The principal coniferous species, white pine, has the volume primarily in the 10-inch and up d.b.h. class in all age classes.

The principal hardwood species in the mature age class produce predominantly sawlog size material

TABLE 11. — *Cubic-foot volumes of primary growing stock on patented land in the Lake Erie district by species and age class in two size classes.*

Species	Mature		Immature		All-aged		Total patented land
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thou- sand cu. ft.	Thou- sand cu. ft.	Thou- sand cu. ft.	Thou- sand cu. ft.	Thou- sand cu. ft.	Thou- sand cu. ft.	Thou- sand cu. ft.
White pine	45	497	516	1,214	650	2,143	5,065
Red pine					228	396	624
White spruce			20	10			30
Black spruce			5				5
Balsam fir			74	7			81
Hemlock	112	197	185	351	185	485	1,515
White cedar	85	106	1,744	391	281	126	2,733
Larch	3	2	254	101			360
TOTAL CONIFERS	245	802	2,798	2,074	1,344	3,150	10,413
Sugar maple	3,812	17,480	8,407	5,224	7,472	12,984	55,379
Soft maple	4,460	32,528	15,117	13,463	9,858	22,972	98,398
White birch	7	13	1,372	220	105	54	1,771
Yellow birch	478	724	2,113	834	1,100	1,057	6,306
Beech	2,333	12,718	6,456	7,426	4,164	10,365	43,462
Elm	8,488	47,119	27,395	29,740	14,527	39,722	166,991
Ironwood	910	147	2,485	116	1,609	256	5,523
Red oak	749	6,053	6,457	6,600	2,859	8,984	31,702
White oak	1,552	6,197	5,612	5,877	3,565	7,267	30,070
Poplar	1,172	3,067	9,733	4,851	1,309	1,876	22,008
Black ash	568	336	2,646	491	1,025	653	5,719
White ash	3,224	9,230	11,470	7,766	4,803	9,798	46,291
Basswood	1,203	6,192	3,931	4,816	1,465	5,488	23,095
Black cherry	545	1,430	2,862	2,980	1,197	2,002	10,116
Butternut			1		223	606	830
Hickory	2,026	2,350	8,434	3,375	3,370	3,199	22,754
TOTAL HARDWOODS	31,527	145,585	114,490	92,879	58,651	127,283	570,415
TOTAL ALL SPECIES	31,772	146,387	117,288	94,953	59,995	130,433	580,828

(fig. 10). This size class contains 82 per cent of the sugar maple volume, 88 per cent of the soft maple, 84 per cent of the beech, 85 per cent of the elm, 89 per cent of the red oak, 80 per cent of the white oak, 72 per cent of the poplar, 74 per cent of the white ash and 84 per cent of the basswood.

In the immature age class, this volume is more evenly divided between the two size classes. Sugar maple, soft maple, poplar and white ash have the greater percentage of their volume in the smaller size class, while beech, elm, red and white oak and basswood have most of their volume in the larger size class (fig. 11).



White elm tree killed by the Dutch Elm disease.

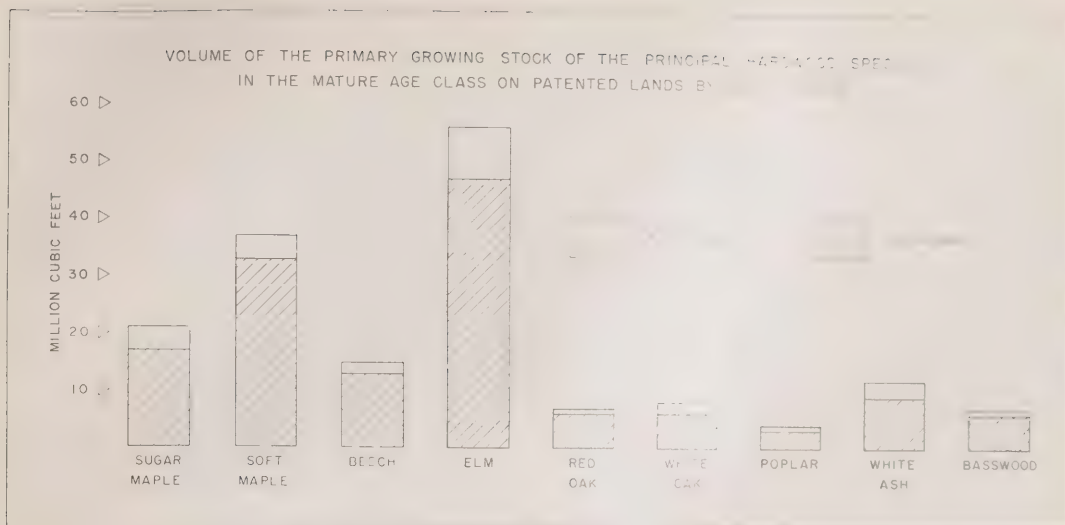


FIGURE 10

The all-aged stands have most of the hardwood volume in the 10-inch and over size class (fig. 12). Sugar maple has 63 per cent of its volume in this class, soft maple 70 per cent, beech 71 per cent, elm 73 per cent, red oak 76 per cent, white oak 67 per cent, white ash 67 per cent and basswood 79 per cent.

Crown lands, with a total volume just under 16 million cubic feet, have 82 per cent of the mature and 68 per cent of the all-aged volume in the larger size class and 55 per cent of the immature volume in the smaller size class.

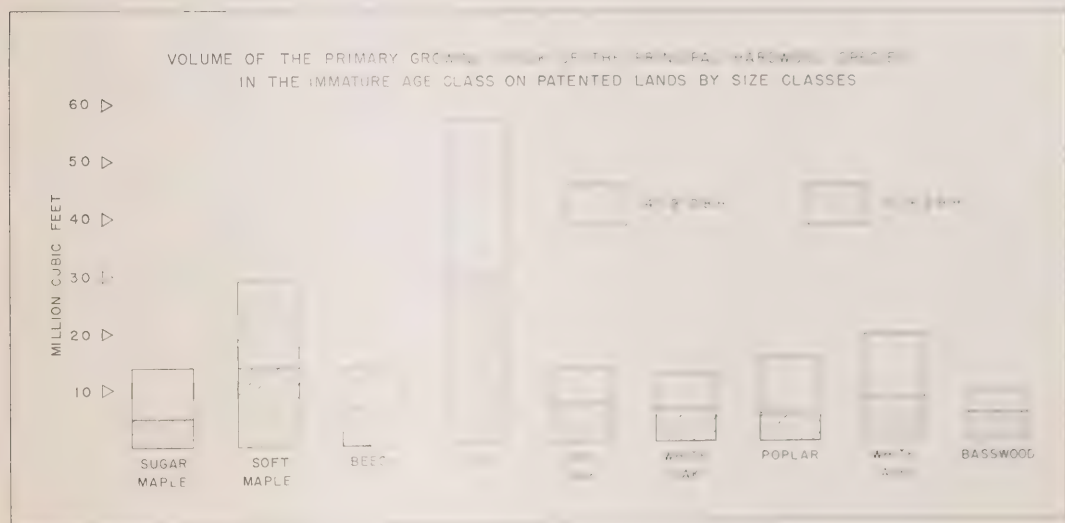


FIGURE 11

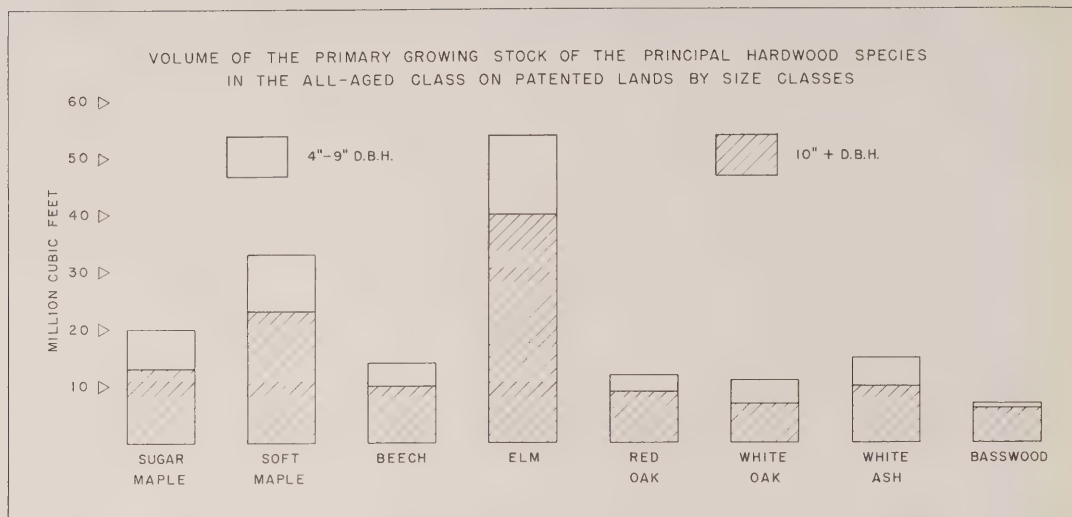


FIGURE 12

Allowable Cut

The allowable cut has been computed for each species with the aid of a volumetric formula¹ and appropriate rotation² for the species. Thus the amount of the allowable cut results from the volume of the primary growing stock and the rotation age adopted for each species encountered in the district.

The calculation of allowable cut, based on the present volume of the primary growing stock, is of value for a period of about ten years. The size and structure of the primary growing stock, upon which the allowable cut calculations are based, changes from year to year, owing to woods operations and growth of the stands. Because of this, the allowable cut should be recalculated on expiration of the initial ten-year period. With effective forestry practices, allowable cuts for the valuable species will increase; without them the proportion of less desirable species in the stands will grow greater.

The annual allowable cut, or net depletion, permissible under management in the Lake Erie district is 14,649,165 cubic feet: 184,275 cubic feet from Crown lands and 14,464,890 cubic feet from patented lands. Of the total allowable cut, 99 per cent is on patented lands.

CROWN LAND

The annual allowable cut for Crown land represents only 1.2 per cent of the primary growing stock, or 17.4 cubic feet per acre for the productive forest area. The permissible cut of 184,275 cubic feet (table 12) is composed entirely of deciduous species. Two species comprise 59 per cent of the present allowable cut: soft maple 35 per cent and elm 24 per cent.

TABLE 12. — Annual allowable cut for all species on Crown lands in the Lake Erie district.

Species	Annual allowable cut cu. ft.
Sugar maple.....	12,825
Soft maple.....	64,115
Yellow birch.....	860
Beech.....	8,970
Elm.....	44,880
Ironwood.....	1,290
Red oak.....	4,065
White oak.....	3,070
Poplar.....	10,260
Black ash.....	1,050
White ash.....	15,180
Basswood.....	10,000
Black cherry.....	2,340
Hickory.....	5,370
TOTAL HARDWOODS.....	184,275
TOTAL ALL SPECIES.....	184,275

¹ Method of calculation of allowable cut is given in Appendix, methods, allowable cut, page 30.

² Rotation, by species, table 15, page 30.

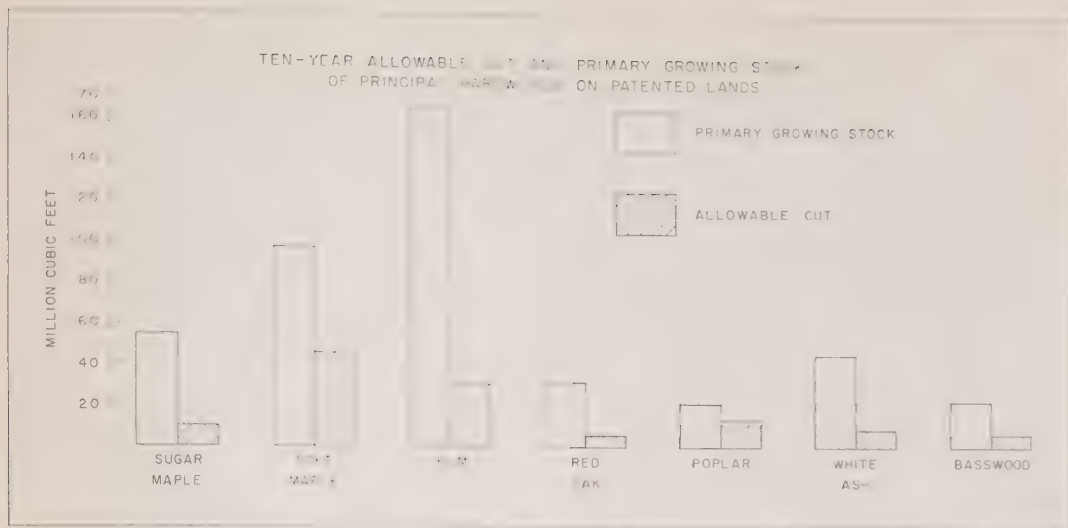


FIGURE 13

PATENTED LAND

The annual allowable cut for patented lands is 14,464,890 cubic feet (table 13). This represents 2.5 per cent of the primary growing stock, or 46.6 cubic feet per acre for the productive forest land.

TABLE 13. — Annual allowable cut for all species on patented lands in the Lake Erie district.

Species	Annual allowable cut
White pine	105,520
Red pine	19,500
White spruce	935
Black spruce	105
Balsam fir	2,530
Hemlock	18,940
White cedar	51,245
Larch	9,000
TOTAL CONIFERS	201,775
Sugar maple	1,038,360
Soft maple	4,612,405
White birch	55,345
Yellow birch	98,530
Beech	543,275
Elm	3,131,080
Ironwood	103,555
Red oak	594,410
White oak	375,875
Poplar	1,375,500
Black ash	107,230
White ash	867,955
Basswood	721,720
Black cherry	189,675
Butternut	15,560
Hickory	426,640
TOTAL HARDWOODS	14,257,115
TOTAL ALL SPECIES	14,464,890

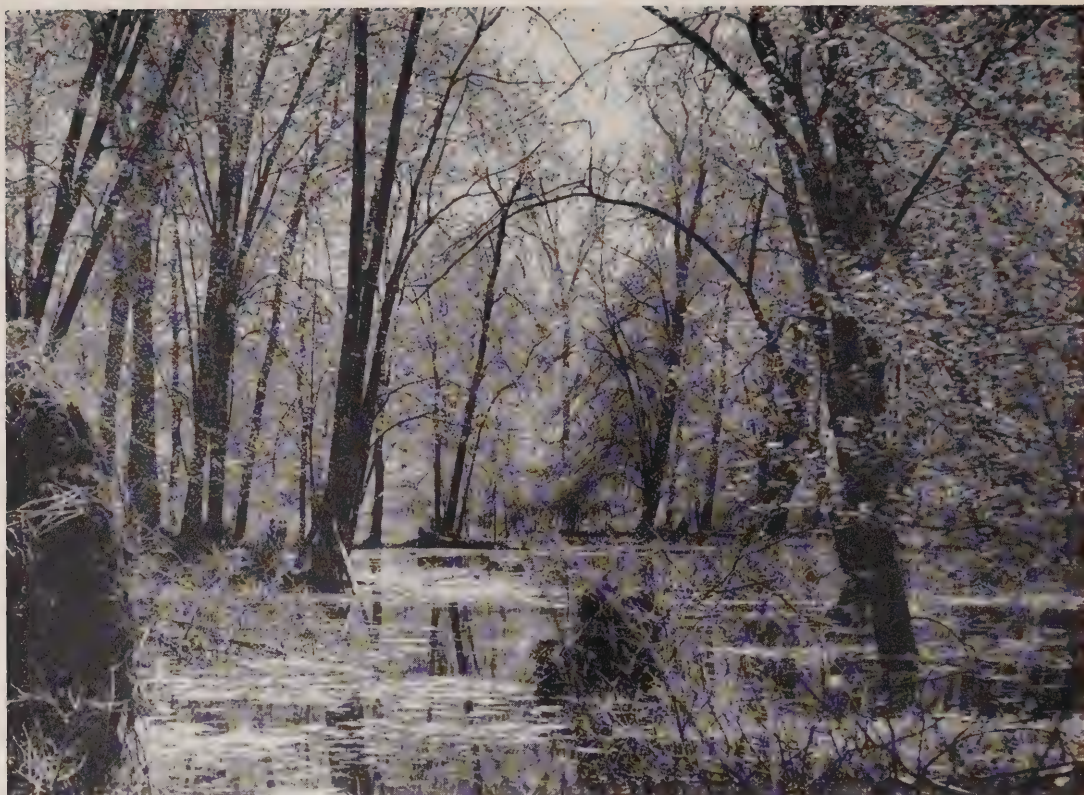
The annual allowable cut is 2.0 per cent of the primary growing stock for conifers and 2.5 per cent for hardwoods.

Coniferous species comprise only 1.4 per cent of the allowable cut. White pine forms 51 per cent of the coniferous allowable cut, but this represents only 0.7 per cent of the allowable cut for patented lands.

Seventy-one per cent of the hardwood allowable cut is obtained from four of the sixteen hardwood species. Soft maple forms 32 per cent of the allowable cut, elm 22 per cent, poplar 10 per cent, and sugar maple 7 per cent. Figure 13 graphically illustrates the relationship of the allowable cut for a ten-year period to the volume of the primary growing stock for hardwoods.



The smaller European elm bark beetle, *Scolytus multistriatus*, which is the principal carrier of the Dutch Elm disease. Life size of beetle is about $\frac{1}{8}$ inch long.



Forests within the district are generally restricted to the poorer and moister sites.

Utilization vs. Allowable Cut

No statistics relating to the annual cut of timber on Crown lands in the Lake Erie district are collected by the Department of Lands and Forests. This district is essentially an area of privately owned land for which data pertaining to timber production are not readily available. The volume and value of products produced from farm woodlots in 1950¹ is as follows:

Fuelwood.....	94,848 cords
Posts.....	14,304 pieces
Logs.....	3,461,029 board feet
Poles.....	721 pieces

The above products were estimated¹ to have a value of \$778,003. Most of these were utilized directly on the farm, but the remainder produced a cash value of \$267,073. In addition, maple syrup and maple sugar produced within the district were valued¹ at \$86,393.

¹ Census of Canada, 1951, Volume VI, Table 27.

By the use of appropriate converting factors, the wood volumes are expressed in gross total cubic feet (table 14). Because of the lack of adequate data, no comparison by species is possible. A comparison of the total actual cut derived in this manner with the total allowable cut indicates that patented lands are being overcut annually by 5,201,535 cubic feet. This represents an annual overcut of some 36 per cent, and when coupled with the losses of elm, that appear inevitable due to the Dutch Elm disease, indicates a marked reduction in timber volume within this district during the next decade.

TABLE 14. — *Gross total cubic-foot volume of wood produced from patented land in one year in the Lake Erie district.*

Fuelwood.....	17,153,360
Posts.....	40,485
Logs.....	2,452,175
Poles.....	20,405
TOTAL.....	19,666,425

APPENDIX

Survey Methods

- The forest resources inventory for the Province of Ontario was carried out by the Aerial Photographic Method. Photographs were taken from a height of 7,920 feet above mean ground level with a six-inch focal length camera to produce photographs at a scale of four inches to the mile (1/15,840). Following the photography, semi-controlled photo maps were prepared.

A photo map, or aerial mosaic, is an assembly of individual aerial photographs fitted together systematically to form a composite view of the entire area covered by the photographs. In Southern Ontario, a photo map covers 7'30" of latitude and 15' of longitude — approximately one hundred square miles. A six-digit index related to latitude and longitude permits the ready location of any photo map.

In constructing a photo map, the prints are mounted on a hard-surface, non-porous board, such as masonite, upon which control points have been plotted. The road network of Southern Ontario has been used to control the scale of the photo maps. To prepare a print for mounting, the central portion is cut out in an irregular shape and the edges are feathered to produce a margin thinner than the remainder of the print. The technique of feathering the edges ensures smoothness as layers of prints are mounted, and makes the edges of the prints less perceptible to the eye and to the camera. After a liberal application of adhesive, the print is oriented on to the control and adjusted to coincide with the detail on adjacent photographs. Upon completion of the mosaic, necessary data are printed on the mosaic in white ink. In order to reduce the inherent instability of the photo map to a minimum, and to avoid checks and other disfigurements, it is photographed as soon as possible after completion. Because of the size of the mosaic it is photographed in two sections, producing an east and a west half for each sheet. Upon production of the negative, prints are readily available.

Interpretation of forest types was carried out on stereoscopic pairs of photographs, and the data were then transferred to the mosaic. Forest data were drafted on a linen overlay, and the ozalid prints of this comprise the forest type maps of this area.

Systematic sampling was carried out by the field crews who collected all the data necessary for making volume estimates. Photographs were taken during the summers of 1954, 1955 and 1956, and field sampling was carried out in the summer of 1957. On the completion of the field work, finished forest type maps were prepared and areas determined by the usual methods¹.

Volume estimates were prepared for type aggregates. For this purpose, types were classified into three cover types: coniferous, hardwood and mixed-woods. These were separated into three age classes: mature, immature and all-aged. The volume per acre for each cover type for the mature and immature age classes was then summarized from the field tallies into three density classes. The all-aged stands were not segregated into density classes. Summaries were made separately for the two ecological sections in the Lake Erie district. The per acre volumes in cubic feet, made up in this manner, are shown in tables 16 and 17.

Mean Annual Increment

The mean annual increment to the rotation age was calculated by dividing the total mature volume for each species by the respective rotation age. The results were totalled and the sum divided by the area of the mature age class.

The mean annual increment to the rotation age for Crown lands amounts to 27 cubic feet per acre, and for patented lands to 39 cubic feet per acre. These figures should be regarded as approximate, since no age class other than the mature was considered in the calculations.

Age Classes

The age classes in their present form do not permit of the usual method of arriving at sustained yield, because there are no figures for areas by species. The immature age class may have an age range from 10 to 120 years and the mature age class from 30 to 300 years, depending on the species. Stands classed as all-aged contain trees that range in age through all the age classes recognized in this report. Therefore, the normal area for each age class cannot be obtained.

¹ A complete statement of the methods used in the forest resources inventory is contained in the Manual of Timber Management, Department of Lands and Forests, Ontario, Parts II and III.

Rotation

In view of the absence of local studies on maturity of stands, the mature age figures shown in Class Ib¹ were used as rotation ages for each species encountered. In addition, the rotation age of one hundred years has been adopted arbitrarily for the miscellaneous hardwood species (table 15).

TABLE 15. — *Rotation by species.*

Species	Crown land <i>years</i>	Patented land <i>years</i>
White pine.....	120	90
Red pine.....	100	60
White spruce.....	100	60
Black spruce.....	120	90
Balsam fir.....	90	60
Hemlock.....	300	150
White cedar.....	200	100
Larch.....	100	75
Sugar maple.....	200	100
Soft maple.....	70	40
White birch.....	80	60
Yellow birch.....	150	120
Beech.....	200	150
Elm.....	150	100
Ironwood.....	100	100
Red oak.....	200	100
White oak.....	300	150
Poplar.....	50	30
Black ash.....	100	100
White ash.....	100	100
Basswood.....	90	60
Black cherry.....	100	100
Butternut.....	100	100
Hickory.....	100	100

Allowable Cut

(a) METHOD

The following two bases were available for calculation of the allowable cut: (1) the volumes of the mature, immature and all-aged stands for each species, and (2) the adopted rotations.

The compilation was carried out in such a way that volumes were shown by species. This suggests the calculation of allowable cut by individual species, separately, rather than for the total primary growing stock in the district, and the method of calculation most suitable to the available data is a volumetric formula.

In view of this, the "French Method of 1883"² was considered and found to be satisfactory for the

¹ Manual of Timber Management, Department of Lands and Forests, Ontario, Part II, page 50.

² L. Pardé — *Traité pratique d'aménagement des forêts*, Paris, 1930.

following reasons: 1. The ratio of the volume per acre of mature to immature age class was found to be approximately 5/3 as required by the French method. 2. The French method is recognized as sound enough, though not entirely free from those disadvantages normally connected with the volumetric methods of regulating yield. The method tends to build up a normal growing stock, and the results of the calculations may be considered rather conservative.

(b) FORMULA

In the present calculations, the following formulae were used:

$$(1) \text{ Crown land: } P = \frac{V.1.}{n/3}$$

$$(2) \text{ Patented land: } P = \frac{\frac{5}{8} (V.1. + V.2. + V.3.)}{n/3}$$

where:

V.1. — denotes volume of mature timber (Age Class I).

V.2. — denotes volume of immature timber (Age Class II).

V.3. — denotes volume of mature and immature timber in all-aged stands.

n — denotes rotation.

p — denotes allowable cut.

Formula (1) was used for Crown lands, since it is the practice in Ontario to limit utilization on these areas to mature timber. In addition, much of the Crown forest within the district occurs on county and authority forests where it is the present aim to build up the growing stock, rather than to deplete it through operations in immature timber. A considerable proportion also occurs in Provincial Parks, where aesthetic values are likely to be given preference over straight timber values. In view of these considerations, it is felt that during the present rotation, only a limited amount of timber will be extracted from Crown lands.

On patented lands, formula (2) was used since it is reasonable to assume that with a high population and a heavy demand for wood, the owners of these lands will be willing to utilize a portion of their immature stands to satisfy this demand.

With the aid of the above formulae, the allowable cut has been calculated for each species, separately, with full consideration of the actual growing stock of each species and the appropriate rotation. The results of individual calculations for each species have been totalled and shown as allowable cut for Crown lands and for patented lands, respectively.

Dutch Elm Disease

The Dutch Elm disease, or Graphium wilt of elm, is well-distributed throughout all the counties of the Lake Erie district. This disease, which attacks all species of American and European elms, is caused by the fungus *Ceratocystis ulmi* (Buism.) C. Moreau. The causal fungus is transmitted from diseased to healthy trees by the native elm bark beetle, *Hylurgopinus rufipes* (Eichh.) and the smaller European elm bark beetle, *Scolytus multistriatus* (Marsh.).

The forested areas of the Lake Erie district contain 172 million cubic feet of elm, which comprises 29 per cent of the total wood volume in the district. Since it will not be economically possible to control the Dutch Elm disease in these areas by chemical treatment, a considerable loss of elm and a consequent

reduction of the growing stock in the district appears inevitable.

The calculated allowable cut for elm shown in the report is based on a healthy forest condition. In view of the losses that may be expected from the Dutch Elm disease the allowable cut should be modified, and every effort should be made to increase the utilization of elm to a maximum. In addition, sanitation cuts should be made, where possible, to remove diseased trees and stands, and thus reduce the rate of spread of the disease.

Photographs of the elm trees and bark beetle are the work of Miss J. F. Robinson, and were kindly supplied by the Forest Biology Laboratory, Canada Department of Agriculture, Maple, Ontario.

Common and Botanical Names of Tree Species Included in Timber Estimates

CONIFERS

White pine.....	<i>Pinus Strobus</i> L.
Red pine.....	<i>Pinus resinosa</i> Ait.
Jack pine.....	<i>Pinus Banksiana</i> Lamb.
Scots pine.....	<i>Pinus sylvestris</i> L.
White spruce.....	<i>Picea glauca</i> (Moench) Voss
Black spruce.....	<i>Picea mariana</i> (Mill.) BSP.
Norway spruce.....	<i>Picea abies</i> (L.) Karst.
Balsam fir.....	<i>Abies balsamea</i> (L.) Mill.
Hemlock.....	<i>Tsuga canadensis</i> (L.) Carr.
White cedar.....	<i>Thuja occidentalis</i> L.
Eastern larch.....	<i>Larix laricina</i> (Du Roi) Koch
European larch.....	<i>Larix decidua</i> Mill.

HARDWOODS

Sugar maple.....	<i>Acer saccharum</i> Marsh.
Soft maple.....	<i>Acer rubrum</i> L. <i>Acer saccharinum</i> L.
White birch.....	<i>Betula papyrifera</i> Marsh.
Yellow birch.....	<i>Betula lutea</i> Michx. f.
Beech.....	<i>Fagus grandifolia</i> Ehrh.

Elm.....	<i>Ulmus americana</i> L. <i>Ulmus rubra</i> Muhl. <i>Ulmus Thomsii</i> Sarg.
Ironwood.....	<i>Ostrya virginiana</i> (Mill.) K. Koch
Red oak.....	<i>Quercus rubra</i> L. <i>Quercus palustris</i> Muenchh. <i>Quercus velutina</i> Lam.
White oak.....	<i>Quercus alba</i> L. <i>Quercus macrocarpa</i> Michx. <i>Quercus bicolor</i> Willd. <i>Quercus Muehlenbergii</i> Engelm. <i>Quercus prinoides</i> Willd.
Poplar.....	<i>Populus tremuloides</i> Michx. <i>Populus balsamifera</i> L. <i>Populus grandidentata</i> Michx. <i>Populus deltoides</i> Marsh.
Black ash.....	<i>Fraxinus nigra</i> Marsh.
White ash.....	<i>Fraxinus americana</i> L. <i>Fraxinus pennsylvanica</i> Marsh. <i>Var. subintegerrima</i> (Vahl) Fern.
Basswood.....	<i>Tilia americana</i> L.
Black cherry.....	<i>Prunus serotina</i> Ehrh.
Walnut.....	<i>Juglans nigra</i> L.
Butternut.....	<i>Juglans cinerea</i> L.
Hickory.....	<i>Carya ovata</i> (Mill.) K. Koch <i>Carya cordiformis</i> (Wang) K. Koch <i>Carya tomentosa</i> Nutt. <i>Carya glabra</i> (Mill.)

TABLE 16. — Volume of the primary growing stock in cubic feet per acre.
Niagara Section — 1957

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)			CONIFEROUS IMMATURE (C-II)			ALL-AGED
		DENSITY CLASS			DENSITY CLASS			
		1	2	3	1	2	3	
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	
White pine.....	4''-9'' 10'' up	18.7 120.7	15.9 102.8	9.9 64.3	9.8 159.4	7.8 126.0	4.6 75.5	..........
White spruce.....	4''-9'' 10'' up	3.0 13.2	2.5 11.3	1.6 7.0	68.0 34.6	53.8 27.3	32.2 16.4	..........
Black spruce.....	4''-9'' 10'' up	..... .....	..... .....	..... .....	16.6	13.2	7.9.....	..........
Balsam fir.....	4''-9'' 10'' up	35.0 20.1	29.8 17.1	18.6 10.7	208.2 24.7	164.7 19.5	98.6 11.7	..........
Hemlock.....	4''-9'' 10'' up	127.8 361.7	108.8 307.9	68.0 192.5	11.5 38.4	9.1 30.4	5.4 18.2	..........
White cedar.....	4''-9'' 10'' up	682.1 861.1	580.7 733.0	362.9 458.2	1039.6 205.5	822.2 162.5	492.2 97.3	..........
Larch.....	4''-9'' 10'' up	0.7 5.8	0.6 4.9	0.4 3.1	61.0	48.3	28.9.....	..........
TOTAL CONIFERS.....	4''-9'' 10'' up	867.3 1382.6	738.3 1177.0	461.4 735.8	1414.7 462.6	1119.1 365.7	669.8 219.1	..........
Sugar maple.....	4''-9'' 10'' up	10.2 151.9	8.7 129.3	5.4 80.9	1.7 20.5	1.4 16.1	0.8 9.7	..........
Soft maple.....	4''-9'' 10'' up	8.7 46.4	7.4 39.5	4.6 24.7	11.2	8.8	5.3.....	..........
White birch.....	4''-9'' 10'' up	16.5 19.2	14.0 16.4	8.8 10.2	104.7 67.2	82.8 53.2	49.6 31.8	..........
Yellow birch.....	4''-9'' 10'' up	35.3 120.3	30.1 102.4	18.8 64.0	44.1 50.2	34.9 39.7	20.9 23.7	..........
Beech.....	4''-9'' 10'' up	4.9 131.3	4.2 111.7	2.6 69.9	27.7	21.9	13.1.....	..........
Elm.....	4''-9'' 10'' up	15.4 221.3	13.1 188.4	8.2 117.7	53.7 170.9	42.4 135.2	25.4 81.0	..........
Ironwood.....	4''-9'' 10'' up	7.1 9.1	6.1 7.7	3.8 4.8	..........	..........	..........	..........
Red oak.....	4''-9'' 10'' up	..... 6.5	..... 5.5	..... 3.4	..........	..........	..........	..........
White oak.....	4''-9'' 10'' up	..... 3.2	..... 2.8	..... 1.7	..........	..........	..........	..........
Poplar.....	4''-9'' 10'' up	13.0 61.6	11.0 52.5	6.9 32.8	163.0 167.0	128.9 132.0	77.2 79.1	..........
Black ash.....	4''-9'' 10'' up	12.0 4.2	10.2 3.6	6.4 2.2	1.9 3.6	1.5 2.8	0.9 1.7	..........
White ash.....	4''-9'' 10'' up	0.9 5.6	0.8 4.7	0.5 3.0	..........	..........	..........	..........
Basswood.....	4''-9'' 10'' up	3.2 81.1	2.7 69.1	1.7 43.1	..........	..........	..........	..........
Black cherry.....	4''-9'' 10'' up	0.2 3.0	0.2 2.6	0.1 1.6	3.2 5.1	2.6 4.0	1.5 2.4	..........
TOTAL HARDWOODS.....	4''-9'' 10'' up	127.4 864.7	108.5 736.2	67.8 460.0	383.5 512.2	303.3 404.9	181.6 242.5	..........
GRAND TOTAL.....	4''-9'' 10'' up	994.7 2247.3	846.8 1913.2	529.2 1195.8	1798.2 974.8	1422.4 770.6	851.4 461.6	..........
TOTAL 4'' UP.....		3242.0	2760.0	1725.0	2773.0	2193.0	1313.0	.....
SPECIES	D.B.H.	HARDWOODS MATURE (H-I)			HARDWOODS IMMATURE (H-II)			HARDWOODS ALL-AGED
		DENSITY CLASS			DENSITY CLASS			
		1	2	3	1	2	3	
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	
White pine.....	4''-9'' 10'' up	..... .....	..... .....	..... .....	2.3 9.4	1.8 7.4	1.1 4.4	5.0 14.7
TOTAL CONIFERS.....	4''-9'' 10'' up	..... .....	..... .....	..... .....	2.3 9.4	1.8 7.4	1.1 4.4	5.0 14.7

TABLE 16. — (Cont'd)

SPECIES	D.B.H.	HARDWOODS MATURE (H-I) (Cont'd)			HARDWOODS IMMATURE (H-II) (Cont'd)			HARDWOODS ALL-AGED (Cont'd)
		DENSITY CLASS			DENSITY CLASS			
		1	2	3	1	2	3	
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Sugar maple.....	4''-9'' 10'' up	88.7 406.7	69.8 320.1	41.7 191.3	96.4 60.4	76.3 47.7	45.4 28.4	104.3 183.8
Soft maple.....	4''-9'' 10'' up	103.2 763.7	81.2 601.1	48.5 359.3	168.6 147.2	133.5 116.4	79.4 69.2	137.8 325.7
White birch.....	4''-9'' 10'' up	..... .....	..... .....	..... .....	10.2 1.5	8.0 1.2	4.8 0.7	..........
Yellow birch.....	4''-9'' 10'' up	9.7 15.1	7.6 11.9	4.6 7.1	18.4 7.3	14.6 5.8	8.7 3.4	14.1 14.2
Beech.....	4''-9'' 10'' up	54.1 292.6	42.6 230.3	25.4 137.7	75.4 86.1	59.6 68.0	35.5 40.5	59.3 143.1
Elm.....	4''-9'' 10'' up	198.9 1101.3	156.6 866.8	93.6 518.1	310.6 335.9	245.6 257.6	146.1 133.3	205.9 559.2
Ironwood.....	4''-9'' 10'' up	21.3 3.5	16.8 2.7	10.1 1.6	29.1 1.3	22.9 1.1	13.7 0.6	22.8 3.7
Red oak.....	4''-9'' 10'' up	17.6 139.3	13.8 109.7	8.3 65.5	75.0 77.1	59.3 60.9	35.3 36.3	38.7 122.9
White oak.....	4''-9'' 10'' up	35.7 141.8	28.1 111.6	16.8 66.7	64.8 68.6	51.2 54.2	30.5 32.3	48.0 104.1
Poplar.....	4''-9'' 10'' up	27.5 71.6	21.6 56.4	12.9 33.7	102.4 49.7	80.9 39.3	48.2 23.4	18.1 25.8
Black ash.....	4''-9'' 10'' up	13.0 7.6	10.2 6.0	6.1 3.6	27.5 5.3	21.7 4.2	12.9 2.5	13.5 9.3
White ash.....	4''-9'' 10'' up	75.9 217.2	59.8 170.9	35.7 102.2	133.9 90.7	105.8 71.8	63.0 42.7	69.0 141.0
Basswood.....	4''-9'' 10'' up	28.3 145.1	22.2 114.3	13.3 68.3	45.2 55.4	35.7 43.9	21.2 20.1	20.6 77.3
Black cherry.....	4''-9'' 10'' up	12.6 32.8	9.9 25.8	5.9 15.4	32.2 24.0	25.4 19.0	15.1 11.3	17.0 27.8
Butternut.....	4''-9'' 10'' up	..... .....	..... .....	..... .....	..... .....	..... .....	..... .....	3.2 8.3
Hickory.....	4''-9'' 10'' up	47.8 55.4	37.6 43.6	22.5 26.1	98.6 39.5	78.0 31.2	46.4 18.6	48.4 45.9
TOTAL HARDWOODS.....	4''-9'' 10'' up	734.3 3393.7	577.8 2671.2	345.4 1596.6	1288.3 1040.0	1018.5 822.3	606.2 489.3	820.7 1792.1
GRAND TOTAL.....	4''-9'' 10'' up	734.3 3393.7	577.8 2671.2	345.4 1596.6	1290.6 1049.4	1020.3 829.7	607.3 493.7	825.7 1806.8
TOTAL 4'' UP.....		4128.0	3249.0	1942.0	2340.0	1850.0	1101.0	2632.5
		MIXEDWOODS MATURE (M-I)			MIXEDWOODS IMMATURE (M-II)			MIXEDWOODS ALL-AGED
White pine.....	4''-9'' 10'' up	60.7 670.5	48.1 531.1	28.7 317.3	78.2 90.6	62.1 72.1	37.7 43.7	103.4 382.5
Red pine.....	4''-9'' 10'' up	..... .....	..... .....	..... .....	..... .....	..... .....	..... .....	77.1 134.0
Balsam fir.....	4''-9'' 10'' up	..... .....	..... .....	..... .....	2.7	2.1	1.3.....	..........
Hemlock.....	4''-9'' 10'' up	148.5 257.3	117.7 203.8	70.3 121.7	42.4 80.9	33.7 64.3	20.4 39.0	61.5 162.2
White cedar.....	4''-9'' 10'' up	113.9 142.0	90.2 112.5	53.9 67.2	351.2 80.3	279.1 63.8	169.3 38.7	95.0 42.1
Larch.....	4''-9'' 10'' up	4.2 3.1	3.3 2.5	2.0 1.5	58.2 24.9	46.2 19.8	28.1 12.0	..........
TOTAL CONIFERS.....	4''-9'' 10'' up	327.3 1072.9	259.3 849.9	154.9 507.7	532.7 276.7	423.2 220.0	256.8 133.4	337.0 720.8
Sugar maple.....	4''-9'' 10'' up	25.6 142.6	20.2 113.0	12.1 67.5	8.0	6.4	3.9	76.7 81.0
Soft maple.....	4''-9'' 10'' up	105.7 150.2	83.7 119.0	50.0 71.1	162.1 213.1	128.9 169.4	78.1 102.8	109.0 151.4

TABLE 16. — (Cont'd)

SPECIES	D.B.H.	MIXEDWOODS MATURE (M-I) (Cont'd)			MIXEDWOODS IMMATURE (M-II) (Cont'd)			MIXEDWOODS ALL-AGED (Cont'd)
		DENSITY CLASS			DENSITY CLASS			
		1	2	3	1	2	3	
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	
White birch.....	4''-9'' 10'' up	7.5 18.1	6.0 14.3	3.5 8.6	114.2 17.1	90.8 13.6	55.1 8.2	35.1 18.0
Yellow birch.....	4''-9'' 10'' up	87.4 106.4	69.2 84.3	41.4 50.3	127.2 47.0	101.1 37.4	61.3 22.7	41.6 24.4
Beech.....	4''-9'' 10'' up	49.0 327.6	38.8 259.4	23.2 155.0	4.0 14.8	3.2 11.7	1.9 7.1	22.7 158.3
Elm.....	4''-9'' 10'' up	54.9 467.9	43.5 370.6	26.0 221.3	192.0 435.1	152.5 345.9	92.5 209.8	96.4 351.3
Ironwood.....	4''-9'' 10'' up	3.7	2.9	1.7 .....	..... .....	..... .....	..... .....	11.0
Red oak.....	4''-9'' 10'' up	6.6 198.1	5.2 157.0	3.1 93.8	14.6 6.8	11.6 5.4	7.0 3.3	63.2 167.5
White oak.....	4''-9'' 10'' up	51.9 251.6	41.1 199.2	24.5 119.0	20.5 6.3	16.3 5.0	9.9 3.0	84.8 26.5
Poplar.....	4''-9'' 10'' up	10.4 37.1	8.2 29.5	4.9 17.6	218.0 133.1	173.3 105.7	105.1 64.2	18.1 29.7
Black ash.....	4''-9'' 10'' up	21.7 11.2	17.2 8.9	10.3 5.3	67.7 7.3	53.8 5.8	32.7 3.5	29.3 2.1
White ash.....	4''-9'' 10'' up	3.4 18.5	2.7 14.7	1.6 8.8	5.4	4.3	2.6	11.3 16.9
Basswood.....	4''-9'' 10'' up	6.9 26.0	5.5 20.6	3.3 12.3	14.0 12.8	11.1 10.2	6.7 6.2	13.1 45.6
Black cherry.....	4''-9'' 10'' up	14.5 51.3	11.5 40.6	6.9 24.3	24.1 5.4	19.1 4.3	11.6 2.6	6.9 26.6
Butternut.....	4''-9'' 10'' up	..... .....	..... .....	..... .....	..... .....	..... .....	..... .....	0.6 11.1
Hickory.....	4''-9'' 10'' up	..... .....	..... .....	..... .....	..... .....	..... .....	..... .....	9.0 9.3
TOTAL HARDWOODS.....	4''-9'' 10'' up	449.2 1806.6	355.7 1431.1	212.5 854.9	971.8 898.8	772.4 714.4	468.4 433.4	628.8 1119.7
GRAND TOTAL.....	4''-9'' 10'' up	776.5 2879.5	615.0 2281.0	367.4 1362.6	1504.5 1175.5	1195.6 934.4	725.2 566.8	965.8 1840.5
TOTAL 4'' UP.....		3656.0	2896.0	1730.0	2680.0	2130.0	1292.0	2806.3



TABLE 17. — Volume of the primary growing stock in cubic feet per acre.
Huron Section — 1957

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)			CONIFEROUS IMMATURE (C-II)			ALL-AGED
		DENSITY CLASS			DENSITY CLASS			
		1	2	3	1	2	3	
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	
White pine.....	4''-9'' 10'' up	18.7 120.7	15.9 102.8	9.9 64.3	9.8 159.4	7.8 126.0	4.6 75.5	
White spruce.....	4''-9'' 10'' up	3.0 13.2	2.5 11.3	1.6 7.0	68.0 34.6	53.8 27.3	32.2 16.4	
Black spruce.....	4''-9'' 10'' up	.....	.....	.....	16.6	13.2	7.9	
Balsam fir.....	4''-9'' 10'' up	35.0 20.1	29.8 17.1	18.6 10.7	208.2 24.7	164.7 19.5	98.6 11.7	
Hemlock.....	4''-9'' 10'' up	127.8 361.7	108.8 307.9	68.0 192.5	11.5 38.4	9.1 30.4	5.4 18.2	
White cedar.....	4''-9'' 10'' up	682.1 861.1	580.7 733.0	362.9 458.2	1039.6 205.5	822.2 162.5	492.2 97.3	
Larch.....	4''-9'' 10'' up	0.7 5.8	0.6 4.9	0.4 3.1	61.0	48.3	28.9	
TOTAL CONIFERS.....	4''-9'' 10'' up	867.3 1382.6	738.3 1177.0	461.4 735.8	1414.7 462.6	1119.1 365.7	669.8 219.1	
Sugar maple.....	4''-9'' 10'' up	10.2 151.9	8.7 129.3	5.4 80.9	1.7 20.5	1.4 16.1	0.8 9.7	
Soft maple.....	4''-9'' 10'' up	8.7 46.4	7.4 39.5	4.6 24.7	11.2	8.8	5.3	
White birch.....	4''-9'' 10'' up	16.5 19.2	14.0 16.4	8.8 10.2	104.7 67.2	82.8 53.2	49.6 31.8	
Yellow birch.....	4''-9'' 10'' up	35.3 120.3	30.1 102.4	18.8 64.0	44.1 50.2	34.9 39.7	20.9 23.7	
Beech.....	4''-9'' 10'' up	4.9 131.3	4.2 111.7	2.6 69.9	27.7	21.9	13.1	
Elm.....	4''-9'' 10'' up	15.4 221.3	13.1 188.4	8.2 117.7	53.7 170.9	42.4 135.2	25.4 81.0	
Ironwood.....	4''-9'' 10'' up	7.1 9.1	6.1 7.7	3.8 4.8	.....	.....	.....
Red oak.....	4''-9'' 10'' up	6.5	5.5	3.4	.....	.....	.....
White oak.....	4''-9'' 10'' up	3.2	2.8	1.7	.....	.....	.....
Poplar.....	4''-9'' 10'' up	13.0 61.6	11.0 52.5	6.9 32.8	163.0 167.0	128.9 132.0	77.2 79.1	
Black ash.....	4''-9'' 10'' up	12.0 4.2	10.2 3.6	6.4 2.2	1.9 3.6	1.5 2.8	0.9 1.7	
White ash.....	4''-9'' 10'' up	0.9 5.6	0.8 4.7	0.5 3.0	.....	.....	.....
Basswood.....	4''-9'' 10'' up	3.2 81.1	2.7 69.1	1.7 43.1	.....	.....	.....
Black cherry.....	4''-9'' 10'' up	0.2 3.0	0.2 2.6	0.1 1.6	3.2 5.1	2.6 4.0	1.5 2.4	
TOTAL HARDWOODS.....	4''-9'' 10'' up	127.4 864.7	108.5 736.2	67.8 460.0	383.5 512.2	303.3 404.9	181.6 242.5	
GRAND TOTAL.....	4''-9'' 10'' up	994.7 2247.3	846.8 1913.2	529.2 1195.8	1798.2 974.8	1422.4 770.6	851.4 461.6	
TOTAL 4'' UP.....		3242.0	2760.0	1725.0	2773.0	2193.0	1313.0	
SPECIES	D.B.H.	HARDWOODS MATURE (H-I)			HARDWOODS IMMATURE (H-II)			HARDWOODS ALL-AGED
		DENSITY CLASS			DENSITY CLASS			
		1	2	3	1	2	3	
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	
White pine.....	4''-9'' 10'' up	.....	.....	.....	1.8 3.1	1.5 2.4	0.9 1.4	
Balsam fir.....	4''-9'' 10'' up	.....	.....	.....	2.5	2.0	1.2	

TABLE 17 — (Cont'd)

SPECIES	D.B.H.	HARDWOODS MATURE (H-I) (Cont'd)			HARDWOODS IMMATURE (H-II) (Cont'd)			HARDWOODS ALL-AGED (Cont'd)
		DENSITY CLASS			DENSITY CLASS			
		1	2	3	1	2	3	
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	
Hemlock.....	4''-9'' 10'' up	12.1 46.0	9.6 36.4	5.7 21.5	23.8 28.1	18.8 22.2	11.2 13.2	21.2 42.7
White cedar.....	4''-9'' 10'' up	4.0 3.3	3.2 2.6	1.9 1.5	24.8 9.8	19.5 7.8	11.7 4.6	7.2 8.3
TOTAL CONIFERS.....	4''-9'' 10'' up	16.1 49.3	12.8 39.0	7.6 23.0	52.9 41.0	41.8 32.4	25.0 19.2	28.4 51.0
Sugar maple.....	4''-9'' 10'' up	260.7 1042.8	206.4 825.7	122.1 488.2	366.4 177.2	289.3 139.9	172.1 83.3	299.4 375.5
Soft maple.....	4''-9'' 10'' up	69.1 337.6	54.7 267.3	32.4 158.0	154.5 112.4	122.0 88.7	72.6 52.8	153.7 274.1
White birch.....	4''-9'' 10'' up	..... .....	..... .....	..... .....	30.4 4.2	24.0 3.3	14.3 2.0	9.7 5.3
Yellow birch.....	4''-9'' 10'' up	20.7 37.4	16.4 29.6	9.7 17.5	25.4 14.1	20.1 11.1	12.0 6.6	28.1 30.2
Beech.....	4''-9'' 10'' up	26.4 547.3	20.9 433.4	12.4 256.2	21.8 49.9	17.2 39.4	10.2 23.5	24.2 126.1
Elm.....	4''-9'' 10'' up	110.1 699.6	87.2 553.9	51.6 327.5	278.5 341.8	210.9 269.8	130.8 160.6	190.4 544.1
Ironwood.....	4''-9'' 10'' up	15.3 10.1	12.1 8.0	7.2 4.7	23.7 1.0	18.7 0.8	11.1 0.5	19.0 4.4
Red oak.....	4''-9'' 10'' up	..... .....	..... .....	..... .....	..... .....	..... .....	..... .....	6.2 34.2
White oak.....	4''-9'' 10'' up	..... .....	..... .....	..... .....	9.7 5.1	7.6 4.1	4.6 2.4	9.0 12.4
Poplar.....	4''-9'' 10'' up	7.0 14.8	5.5 11.7	3.3 6.9	175.9 56.4	138.8 44.6	82.6 26.5	38.4 49.5
Black ash.....	4''-9'' 10'' up	22.1 36.0	17.5 28.5	10.4 16.8	74.4 19.5	58.8 15.4	34.8 9.2	41.6 29.2
White ash.....	4''-9'' 10'' up	16.5 85.2	13.0 67.5	7.7 39.9	82.1 58.7	64.8 46.4	38.6 27.6	40.2 98.1
Basswood.....	4''-9'' 10'' up	16.8 143.0	13.3 113.2	7.9 66.9	61.4 79.4	48.5 62.7	28.9 37.3	27.7 116.1
Black cherry.....	4''-9'' 10'' up	10.3 18.7	8.1 14.9	4.8 8.8	59.1 20.0	46.6 15.8	27.7 9.4	22.7 31.6
Butternut.....	4''-9'' 10'' up	3.6	2.9	1.7.....	..........	..........	..........	..........
Walnut.....	4''-9'' 10'' up	3.6	2.9	1.7.....	..........	..........	..........	..........
Hickory.....	4''-9'' 10'' up	3.4 7.5	2.7 5.9	1.6 3.5	54.0 20.1	42.6 15.9	25.4 9.4	15.9 15.7
TOTAL HARDWOODS.....	4''-9'' 10'' up	578.4 2987.2	457.8 2365.4	271.1 1398.3	1417.3 959.8	1118.9 757.9	665.7 451.1	926.2 1746.5
GRAND TOTAL.....	4''-9'' 10'' up	594.5 3036.5	470.6 2404.4	278.7 1421.3	1470.2 1000.8	1160.7 790.3	690.7 470.3	954.6 1797.5
TOTAL 4'' UP.....		3631.0	2875.0	1700.0	2471.0	1951.0	1161.0	2752.1
		MIXEDWOODS MATURE (M-I)			MIXEDWOODS IMMATURE (M-II)			MIXEDWOODS ALL-AGED
White pine.....	4''-9'' 10'' up	13.3 124.1	10.5 98.0	6.3 59.0	1.7 17.1	1.3 13.5	0.8 8.2	0.5 22.8
White spruce.....	4''-9'' 10'' up	..... .....	..... .....	..... .....	14.7 28.4	11.5 22.4	7.0 13.7	12.6 28.8
Balsam fir.....	4''-9'' 10'' up	16.2	12.8	7.7	70.3 10.4	55.4 8.2	33.7 5.0	26.2 4.3
Hemlock.....	4''-9'' 10'' up	111.1 357.5	87.7 282.4	52.8 169.9	62.4 45.2	49.2 35.6	29.9 21.7	55.1 123.1

TABLE 17 (Cont'd)

SPECIES	D.B.H.	MIXEDWOODS MATURE (M-I) (Cont'd)			MIXEDWOODS IMMATURE (M-II) (Cont'd)			MIXEDWOODS ALL-AGED (Cont'd)
		DENSITY CLASS			DENSITY CLASS			
		1	2	3	1	2	3	
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu.
White cedar.....	4''-9''	294.9	232.9	140.1	512.7	404.1	245.9	208.9
	10'' up	294.9	233.0	140.2	141.2	111.3	67.8	150.0
Larch.....	4''-9''	1.7	1.4	0.8	50.3	39.7	24.1	28.0
	10'' up	6.4	5.0	3.0	14.3	11.2	6.9	15.9
TOTAL CONIFERS.....	4''-9''	437.2	345.3	207.7	712.1	561.2	341.4	331.5
	10'' up	782.9	618.4	372.1	256.6	202.2	123.3	344.9
Sugar maple.....	4''-9''	50.9	40.2	24.2	40.3	31.7	19.3	77.4
	10'' up	203.6	160.8	96.8	40.4	31.9	19.4	130.0
Soft maple.....	4''-9''	78.4	61.9	37.2	80.4	63.4	38.6	36.1
	10'' up	454.9	359.3	216.2	86.4	68.1	41.4	48.1
White birch.....	4''-9''	29.1	23.0	13.8	124.3	98.0	59.6	40.0
	10'' up	19.4	15.3	9.2	42.5	33.5	20.4	33.1
Yellow birch.....	4''-9''	80.1	63.3	38.1	89.0	70.2	42.7	74.4
	10'' up	166.3	131.4	79.0	75.2	59.3	36.1	89.3
Beech.....	4''-9''	6.4	5.0	3.0	2.2	1.8	1.1	8.4
	10'' up	199.6	157.7	94.9	30.1	23.7	14.4	113.1
Elm.....	4''-9''	92.4	73.0	43.9	98.1	77.3	47.1	79.1
	10'' up	1034.8	817.3	491.9	243.7	192.1	116.9	615.8
Ironwood.....	4''-9''	6.8	5.4	3.2	4.6	3.5	2.2	7.3
	10'' up	9.4	7.4	4.5	0.8	0.7	0.4	
Red oak.....	4''-9''							
	10'' up	4.0	3.2	1.9				
Poplar.....	4''-9''	25.6	20.2	12.2	342.4	269.9	164.2	95.2
	10'' up	107.7	85.1	51.2	246.9	194.6	118.5	216.9
Black ash.....	4''-9''	61.0	48.2	29.0	51.8	40.9	24.8	62.2
	10'' up	44.0	34.8	20.9	2.0	1.6	1.0	12.0
White ash.....	4''-9''	10.0	7.9	4.8	20.2	15.9	9.7	8.3
	10'' up	26.4	20.8	12.5	71.3	56.2	34.2	16.3
Basswood.....	4''-9''	11.8	9.3	5.6	6.4	5.0	3.1	38.6
	10'' up	44.8	35.3	21.3	7.1	5.6	3.5	142.2
Black cherry.....	4''-9''	11.4	9.0	5.4	7.3	5.8	3.5	8.0
	10'' up	37.1	29.3	17.6	8.9	6.9	4.2	5.2
Hickory.....	4''-9''							
	10'' up	4.0	3.2	1.9				3.1
TOTAL HARDWOODS.....	4''-9''	463.9	366.4	220.4	867.0	683.4	415.9	538.1
	10'' up	2356.0	1860.9	1119.8	855.3	674.2	410.4	1422.0
GRAND TOTAL.....	4''-9''	901.1	711.7	428.1	1579.1	1244.6	757.3	869.4
	10'' up	3138.9	2479.3	1491.9	1111.9	876.4	533.7	1766.9
TOTAL 4'' UP.....		4040.0	3191.0	1920.0	2691.0	2121.0	1291.0	2636.3



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Hon. J. W. Spooner

Minister

F. A. MacDougall

Deputy Minister